JULY, 1848.

VOLUME I. NO. VII.

THE WESTERN JOURNAL,

OF

AGRICULTURE, MANUFACTURES, MECHANIC ARTS, INTERNAL IMPROVEMENT, COMMERCE,

AND

GENERAL LITERATURE.

Agriculture and the Mechanic Arts are the basis of Civilization.

M. TARVER AND T. F. RISK,
EDITORS AND PROPRIETORS.

PUBLISHED MONTHLY.

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March 1, 1849.

THE

WESTERN JOURNAL,

M. TARVER and T. F. RISK, Editors and Proprietors.

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THE

WESTERN JOURNAL.

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ART. I—ARTIFICIAL AGENTS OF EXCHANGE.

In the last number of the Western Journal, we endeavored to show that although the whole civilized world recognize money as the representative of all other commodities, yet this recognition has reference only to its functions as an agent of exchange, and that its specific value is the subject of agreement between the parties to every transaction. We also noticed the constant tendency of money to accumulate at the great commercial emporiums, and the advantages which this accumulation give to those who reside at or near those places; and having made a practical application of these principles to the economy of the country, we now propose to examine the subject of *credit as an agent of exchange.*

No topic is, perhaps, more familiar to the people of this country than that of credit; yet, when we attempt to trace out its effects, and consider the subject with regard to all its bearings upon the condition of a people, we perceive at each step as we proceed, that it becomes more intricate and difficult of apprehension. Credit may be regarded as absolutely essential to the existence of society; for, without trust or confidence between individuals, no social compact could have been formed in the beginning, nor could society exist even at the present day. If an individual is employed to labor for but one day, he must either credit the employer until the labor is performed, or the employer must pay in advance, and credit the laborer until he executes his work. Hence, credit is the result of necessity, and must have preceded all laws designed to enforce the rights of the creditor; and in cases not induced by necessity, the inference arises that it was originally based upon the moral character of the individual. The introduction of money as an agent of exchange, did not, nor could it obviate the necessity of credit, for both are necessary to the advancement of civilization. The same functions, although differing in power, are common to both. The credit of an individual must necessarily be limited and local, and he who holds the obligation of another can turn it to but little account where the debtor is

unknown; but he who holds money is in some sense the creditor of all mankind. From the fact that a very large portion of the business of every community is carried on through the agency of credit, we are apt to conclude that were credit to cease in the ordinary transaction of buying and selling, the number and amount of exchanges of property would be diminished to an extent equal to the whole amount of the credit transactions; but this result would not follow as a necessary consequence, for it must be borne in mind, that although a commodity may be exchanged for credit, yet this is but the inception of the transaction which is not complete until the credit is liquidated; therefore, in local transactions, it requires, in the end, as much money to effect any given number and amount of exchanges upon credit as would have been required, had no credit intervened. Hence, although the money value of property is occasionally affected by the increase or diminution of credit, yet if the average price for a series of years could be ascertained, we imagine that it would be found to have been but little affected by the amount of credit which had obtained. For, as the common transactions of buying and selling on credit do not directly increase the volume of useful commodities, the amount of money in the country bears the same relation to the amount of property after the exchange, as it did before. Excessive credit, founded upon a spirit of speculation, may raise the price of property for a time, but this advanced rate can not long continue; for the necessity of completing the transactions by liquidating the credits with money, brings the property again to its money value, and the necessity of forcing it upon the market, generally depresses it below the average standard, until the excessive credit is liquidated. Owing to the revulsions consequent upon a redundancy of credit, many conclude that credit is an evil, and opposing it as a system, advocate the policy of basing all transactions upon money. This we have shown to be impracticable, inasmuch as credit, to some extent, is essentially necessary to the existence of civilization. That many evils flow from a redundancy of credit cannot be denied; but we esteem it impossible to define the limits of credit upon any principle of political economy, or by legislative enactments, without doing violence to that free exercise of individual action which is so necessary to both individual and social prosperity. We can imagine but two ways of diminishing the evils of credit: the one by improving and elevating the moral condition of society, and the other by diversifying labor so as to bring the consumer and producer as near to each other as practicable.

If a community, occupying a territory of moderate extent, produced all or nearly all the commodities necessary for its own consumption, there would be little danger that credit would become so much expanded as to produce any material revulsion; but in proportion as the distance at which the exchanges are made is increased, the evils of credit increase also; for the necessity of sending the money out of the country to liquidate balances abroad, disturbs the relation between money and property at home. The former becomes dearer, and the

latter cheaper, and consequently, the difficulty of liquidating the *internal* debt is increased, and a revulsion ensues as an inevitable consequence. The individual who purchased an article of property on a credit at the price of one hundred dollars, must now sell it at fifty dollars, and if he happens to owe half the amount that his property was worth in money, a few months before, and he cannot obtain indulgence until the storm passes, he is ruined. Such consequences could scarcely happen in a community that is not indebted to distant countries—for in such case, if a portion of the community contract debts beyond their ability to pay promptly, yet, as the quantity of money remains the same, there is still a probability of selling their property at the value which it bore when the debts were created; and unless the debtor had been guilty of great folly or extravagance, he would be able to extricate himself and escape from absolute ruin. Hence, we are persuaded that by diminishing our foreign commerce, and producing all the appliances of comfort at home, we shall escape most of the evils incident to an extensive and liberal credit system.

Commerce cannot be carried on extensively at a great distance without the use of credit in some form or other, unless we return to the primitive system of barter; for if, in all cases, money was sent from one country to another to be exchanged for other commodities, it would be kept constantly *in transitu*, and become na article of commerce merely, instead of a circulating medium. By the use of credit in its various forms, very little money enters into foreign commerce, except for the purpose of liquidating balances that arise from over-trading—from failure of crops, depression of prices, or other causes of like nature; but some one or other of these accidents occur with sufficient frequency to give rise to a rapid succession of revulsions. For, as soon as the country has recovered from the effects of one, and begins to prosper, it is again flooded with foreign commodities exceeding in amount the ordinary means of paying for them.

Under ordinary circumstances, very little money enters into the commerce between foreign countries. Nor are the exchanges made by the barter of specific articles, but principally through the agency of credit, based upon the commodities to be exchanged. A merchant in New York purchases goods in Liverpool on credit, the shipper of American produce draws a bill upon his factor in Liverpool, and the New York merchant purchases the bill and remits it to Liverpool to pay for his goods, and thus the money remains at home to perform its proper functions in the internal trade of the respective countries. This looks well in theory and is doubtless the only system upon which foreign commerce can be extensively carried on. But in practice it is subject to many contingencies that are calculated to disturb the relative value of money and property. If, for instance, a large portion of the exports of the United States should consist of wheat; and if, by reason of an unusually large crop in Great Britain and the north of Europe, the demand for wheat should cease, an exigency would arise requiring the shipment of money to pay the balances due for British manufactures. This raises the price

of money in the United States—the drain commences in New York and other eastern cities—the banks contract their discounts to the merchant—money becomes scarce, and the price of produce depressed—the eastern merchant calls upon the merchant in the west for remittances, and the latter pressing upon his customers—the consumers—the drain of specie is established throughout the entire country, and the revulsion becomes complete. Its force and effect will, of course, be in proportion to the amount of specie required to supply the foreign demand. But, although the revulsion may not be so considerable as to ruin a great number of individuals, yet, whatever materially disturbs the relative value of money and property, is an evil—for it is calculated to disappoint the laborer in his just expectations, and while it discourages many from embarking in branches of industry calculated to improve the resources of the country, it excites a spirit of speculation in those who imagine that they possess sufficient foresight to turn the ever-varying and fluctuating prices of property to their own advantage. And finally, these revulsions seriously retard the progressive improvement of the physical and moral condition of society.

We have shown that under ordinary circumstances, the extension of credit does not materially affect the relative value of money and property. An exception to this proposition, however, is found in the case of banks of discount and circulation. Bank bills, circulating as money, and exchangeable at all times for the precious metals, increases the volume of circulation, and consequently raises the price of other commodities. If wisely managed, banks are capable of giving permanency to prices, by breaking the force of the revulsions which arise from the contingencies of foreign commerce; for as long as they possess the confidence of the bill holders, the specie which is drawn from their vaults is but little felt by the community. But it generally happens that either for the want of wisdom in the management of banks, or owing to speculative views on the part of those who control them, instead of giving permanency to the value of money, and sustaining the community against the shocks of revulsions, they are themselves the cause of frequent fluctuations in the value of money and property, and in struggling to sustain themselves, increase the disasters of the community.

Banks of issue tend to cheapen money, and if skilfully directed and thoroughly established in the confidence of all who may in any way be interested in their solvency, they afford to the country in which they are located decided advantages over those wherein no banks exist, provided there should be an extensive commercial intercourse between them. For, besides the advantages of cheap money which we endeavored to illustrate in the first part of this article,* they possess the power of raising and depressing prices at pleasure. The Bank of England, for instance, by raising the rate of interest or curtailing her discounts, can put down the price of our produce at pleasure. This she has frequently done in regard to the price of cotton; and by a simple resolution contained in a few lines,

*See page 291-2.

deprived this country of many millions of dollars which we should otherwise have received in return for that article. It was this power that rendered the bank of the United States so odious to the people of this country. Yet, notwithstanding the sacrifices which were made in putting it down, we are continually striving to place ourselves more and more under the influence of the Bank of England by extending our commerce with Great Britain.

Thus we have endeavored, through a series of numbers, to examine the principles which govern our foreign commerce, and to point out the many disadvantages to which we are subjected by reason of making our exchanges at so great a distance from home. And in the conclusion of the subject we propose to recapitulate the leading propositions, for the purpose of bringing the whole argument to the mind of the reader at one view. The following are the leading points which we have aimed to establish:

1st. That the great number of persons employed in effecting the exchange of commodities at so great a distance, reduces the number of producers, and increases the burthen, while it diminishes the profits of labor; and is, consequently, detrimental to both the moral and mental improvement of the industrial classes.

2d. That in addition to the enormous expenses incident to the transportation of the raw material to the manufacturer, and the cost of returning it in the form of manufactured articles for consumption, its exportation tends to impoverish the soil, and to reduce the country to a state of sterility.

3d. That money continually tends to accumulate at the centre of every commercial system, and by reason of its abundance and cheapness at that point, gives to those residing there an important advantage over those who reside at a great distance from it.

4th. That the physical geography and climate of a country, considered with reference to its relation to other parts of the globe, indicate the proper limits of its commercial system.

5th. That in accordance with the natural laws of commerce, its principal current should move from north to south, and not from east to west; and hence, the propriety and importance of establishing a separate and distinct commercial system in the Mississippi Valley.

6th. That foreign commerce increases the hazard to which credit is ever more or less liable.

7th. That banks add to the advantages which those residing at or near the great commercial emporiums otherwise possess; and finally, that the profits of labor in the United States, and the price of American produce, *are controlled by the Bank of England*, through the medium of our commerce with that country.

Our arguments upon these topics are especially designed for the agricultural classes, for it is upon them almost exclusively that the burthen, and ruinous consequences incident to foreign commerce, fall. The merchant, the carrier, and the manufacturer naturally feel but little interest in the subject, nor do they seem to

consider that a great distance between the consumer and producer is of any material disadvantage to them.

Considering agriculture as the foundation of all other pursuits, we placed it first in our list of subjects; still, practical agriculture has occupied but a very small space in our Journal. In considering the agricultural interest of the west, we felt but little encouragement to aid in the increase of its products—for the enlargement of the volume would only serve to lower the price until western produce would cease to pay transportation to market. This is a consequence understood by almost every farmer; and hence, instead of endeavoring to instruct the agriculturalist in his practical operations, we have aimed, mainly, to expose the disadvantages under which he labours by reason of his remoteness from market. Irrespective of political opinions, and without reference to any authority upon the subject of political economy, we have sought to establish our reasoning upon the principles of natural and social economy. We are fully aware of the difficulty of removing prejudices from the human mind. We know that many individuals are shackled by political opinions, and dare not give free scope to reason, lest light should shine upon their minds, and convince them of error. Still, we are inspired with a hope that our labors will occasionally fall into the hands of individuals who, like ourselves, are in search of truth, and who sincerely desire the advancement of the physical, social and moral condition of this great Valley. Such, we are assured, will give to our views a fair and patient investigation. Should they do so, and should they also coincide with us in opinion, then we hold that they are bound, as lovers of their country and their species, to join us as co-laborers. It is not sufficient that they simply approve; it is their duty to stand forth as advocates, and laying their own hands to the work, let them persevere until the rewards of western labor shall be commensurate with the unrivalled fertility of the soil, and other advantages which a benevolent Creator has bestowed upon this, the most favored region of the earth.

But we have been told that this is an agricultural country, and that the natural and legitimate pursuit of its inhabitants is farming. This is true, but it does not follow as a necessary consequence that we should neglect our mines and permit the boundless source of power which lies dormant in our vast coal fields to remain unemployed; or that we should not create a home market for our agricultural products, by diversifying labor. Again, we are told that men are not capable of performing as much labor in the west as in the east. If this should be true, still it is no argument why labor should not be diversified here, as well as elsewhere. But we believe that it will be found, upon inquiry, that operatives in the manufacturing establishments of the west, work as many hours in the day, and perform as much labor here as in the east. We mention this for the purpose of eliciting from those who are engaged in manufacturing in the west, their opinion upon this subject, and we respectfully invite them to furnish us with the result of their experience and observations in regard to the physical capacity of operatives

in this country. And we furthermore invite every friend to the interest of the west, to afford us such facts in relation to the economy of manufacturing in this region, as they may possess. We feel no apprehension that either capital, skill or labor will be wanting, if we can show to the satisfaction of men that any given article of manufacture can be produced as cheap here, as in New England; for, this fact being established, it will require no argument to convince the most obtuse intellect that the manufacturer here possesses an advantage over him of the east, to the extent of the freight and charges, and this, of itself, would be as large a profit on most articles, as a reasonable individual could desire.

ART. II—A RAIL ROAD FROM THE ATLANTIC TO THE PACIFIC.

WHERE SHALL THE RAIL ROAD BEGIN ON THE ATLANTIC, AND WHERE SHALL IT END ON THE PACIFIC?

THE large addition recently made to our territory bordering on the Pacific, renders it highly important that our government should adopt and carry into effect some efficient mode of facilitating both commercial and social intercourse between its citizens dwelling on the shores of the two great oceans that bound the Republic on the east and west. The project of a railway to the Pacific, which a short time ago appeared so like the offspring of a disordered imagination, has already become a work of national necessity—for, in our opinion, there is scarcely a probability that we can retain our dominion west of the Rocky Mountains when that country becomes strong in population, unless we establish some mode of intercourse that will cherish a lively sympathy between the people of the east and the west.

The following communication from Lieutenant MAURY to the Honorable J. C. CALHOUN, upon the subject of a rail road to the Pacific, contains many facts which we think will be found interesting to our readers. We extract from the Merchants' Magazine:

NATIONAL OBSERVATORY, *March* 29, 1848.

DEAR SIR:—I have the pleasure of sending you, as you requested I would do, a chart showing the relative distances to Monterey and the Columbia river from some of the principal points on the Atlantic coast. I have added such other information as, in my judgment, is calculated to throw light on the interesting subject, as to the best route across the country for reaching, by rail road, the Pacific coast of the United States.

I am clearly of the opinion that a rail road, through the heart of the country to the most convenient point of our Pacific coast, is greatly more in accordance with the true interests of the United States, than any route by canal or rail road that

can be constructed across the narrow neck of land between North and South America.

A chief value of a rail road or canal consists in its collateral advantages, so to speak, by which I mean the advantages which the country and the people, in the vicinity of the improvement, derive from it; such as the increased value of land and property of various kinds.

The increased value which such property has derived from the rail roads and canals in the United States, exceeds, I suppose, the original cost of the works themselves. This, therefore, may be considered a permanent value attached to property of our fellow-citizens, which no reverse of fortune, no enactment of laws, nothing but a destruction of the works themselves, can ever destroy.

A canal between the two continents would not pass through the United States territory, and consequently the citizens of the United States would derive no such collateral advantages from it, nor her statesmen the prerogative of taxing such increased value for the revenues of the country; but they would derive them abundantly from a rail road running through the heart of the Union, and connecting its Atlantic with its Pacific ports.

In this fact is included one of the many reasons which induced me to favor a rail road across the country, in preference to a canal out of the country, for connecting the two oceans.

The question, therefore, is: Where shall the rail road begin on the Atlantic, and where shall it end on the Pacific?

Unfortunately, the present state of topographical information as to the several routes that have been proposed for reaching the Pacific by rail road, is not sufficient to afford a satisfactory reply to this question. I propose to consider it, therefore, only in a geographical and commercial point of view, leaving the final decision of the question to dydrographers and engineers after they shall have made the necessary examinations and surveys.

If we continue to increase our tonnage for the next two or three years at the rate of increase for the last two or three, the shipping of the United States will then exceed that of Great Britain, and the commercial supremacy will be ours, so far, at least, as the business of fetching and carrying is concerned.

If you will examine the accompanying chart, you will observe that I have drawn, *geographically*, the dividing line of commerce between England and the Atlantic ports of the United States. Any point in this line is equidistant from us and from England; consequently England is nearer to all places, including the ports of Europe, the Mediterranean, and of Africa north of the equator, which are to the east of that dividing line, and *geographically* speaking, therefore, can meet us on that side of it with advantage; whereas all places on this side of that line, including her American colonies, the West Indies, and the States of Central and South America as far as the equator, are, *geographically*, more favorably situated for commerce with the United States than with England.

Now it so happens that this dividing line crosses the equator at what may be considered the great thoroughfare of vessels trading to the south of it, whether they be English or American, or whether they be bound around Cape Horn or the Cape of Good Hope. The winds are such as to make this the common and best place of crossing for all such vessels.

Consequently, *geographically* speaking, the ports of Brazil, of the Pacific Ocean, China, and the East Indies, are as convenient to the Atlantic States of the Union as they are to England; and the merchandise of the two countries may be said to meet there precisely on equal terms.

Hitherto, the great channels of trade have led to Europe, yet, notwithstanding that the position of England is much more central than that of the United States with regard to Europe, (the vessels of the former making, in a week, voyages which it takes ours months to accomplish,) we have, under these disadvantages, never ceased to gain on our competitor, and are now about to pass her, with our ships, in the commercial race.

The coasts of Oregon and California are just beginning to feel the energy of American enterprise, and are fast filling up with our citizens. Where they go, there commerce will come. The peopling of these coasts will greatly enlarge the commercial limits of the United States; extending them from lines into a greatly elongated ellipse with its conjugate centres, one on the Pacific, the other on the Atlantic.

Having determined what port on the Pacific offers the most advantages for the commercial focus there, it will then be easy to project the major axis of this new commercial curve; for the line across the country which joins these two centres, will show, geographically, the best route for a rail road between the two oceans.

The shortest distance between two places that are not on the equator, or in the same longitude, is the arc of a great circle, included between them; and this arc appears on the chart as a curve. I have drawn such curves on the chart, and called them great circle routes, because they show the route by which a traveler may go from place to place by accomplishing the smallest number of miles possible, supposing he could follow a line through the air.

You will observe that the great circle, which shows the shortest navigable route between Chili, all the ports of Peru, Ecuador, Central America and Mexico, passes so near to Monterey, that if a steamer bound from Chili to Shanghae, in China, were to pursue the shortest route which it is possible to go, she would make Cape St. Lucas, in Lower California, and might touch at San Diego, Monterey, or San Francisco, by going less than 100 miles out of her way.

But if the point of departure were Panama, then it would be 1,000 miles nearer to take the great circle via California, than to follow the straight compass course by way of the Sandwich Islands.

Monterey or San Francisco, therefore, may be regarded as the great half-way

house on the commercial road between Pacific America and the Indies; and this route as the commercial circle of the Pacific Ocean.

It will be observed that Astoria, in Oregon, occupies by no means such a central position with regard to the commerce of the world.

The line, commencing on the Pacific coast midway between Monterey and the mouth of the Columbia river, and drawn to Philadelphia, I have called the dividing line of travel between Monterey and the mouth of the Columbia. It is so drawn through the country, that any given point on it is equidistant from those two places, so that a traveler who starts from any point to the south of this line is nearer to Monterey; but if he start from a point to the north of it, he is nearer to the mouth of the Columbia.

TABLE OF DISTANCES FROM THE ENGLISH CHANNEL.

To Boston (shortest navigable distance for steamers)	2,670 miles.
Boston, via Albany and the lakes, to Chicago,	1,000
Chicago, by an air line, to Columbia river,	1,650
Total,	5,320
From English Channel, via Philadelphia & Baltimore, to Monterey	5,100
" English Channel to Charleston, S. C., (by water)	3,360
" Charleston to Memphis (rail road)	510
" Memphis to Monterey (air line)	1,500
Total,	5,370

It thus appears that Monterey is quite as central to the European travel as is the mouth of the Columbia, with this advantage, however: the lakes are frozen up half the year, when the Columbia route is impassible; whereas if the travel from Europe come as far south as Philadelphia, Monterey then is the most convenient port. In truth, Chicago is quite as near to Monterey as to the mouth of the Columbia.

While Monterey is, therefore, altogether as convenient a halting-place as the Columbia river for travelers from any part of Europe to China, it has decidedly the advantage with regard to the travel from three-fourths of the States of the Union, from Brazil, the West Indies, and even from the Paific ports of South America.

Were a rail road constructed from Memphis to Monterey, passengers from Chili, Peru, &c., on arriving at Panama, would, instead of continuing on in the Pacific to California, save two or three days by crossing over to Chagres, taking a steamer thence to New Orleans, and up the river to the Memphis and Monterey rail road, and so across the country.

For this reason, therefore, the route to China, via Charleston or New Orleans, to Memphis, and thence to Monterey, would, for all the travel to the south of us,

be hundreds of miles nearer than the route up to Chicago and thence to the Columbia river; nearer for most of the States of the confederacy, and as near for the rest.

The harbors of San Francisco and Monterey are good, and easy of ingress and egress. The mouth of the Columbia is difficult both of ingress and egress. In 1846 Lieut. Howison, one of the most accomplished seamen in the navy, was wrecked in attempting to get to sea from that river. He chartered another vessel for himself and crew to get to Monterey, 600 miles; and though in sight of the open sea, and drawing but eight feet of water, he was detained there sixty-two days, waiting for an opportunity to cross the bar. He was wrecked where the Exploring Expedition found water enough to float a 74.*

Vessels in distress off the mouth of the Columbia river have been baffled in their attempts to enter, and finally, after sundry trials, have found themselves compelled to run down to the ports of California, where they are sure of getting an anchorage.

The rail road to the Pacific should terminate at that port which presents the most advantages for our future dock-yard and great naval station on the Pacific. That port is not the Columbia river, for the reasons just stated. Moreover, the mouth of that river will be overlooked by the English from the excellent ports of Vancouver's Island and the Straits of Fuca. While our crippled vessels should be standing off and on, waiting to get in, they would fall an easy prey to inferior British cruizers, which in safety could watch their movements from the Straits of Fuca.†

* "The Cadboro' anchored in Baker's Bay (mouth of the Columbia river) November 17, 1846, where we remained pent up by adverse winds and a turbulent sea on the bar until the 18th January. Her master, an old seaman, had been navigating this coast and river for the last eighteen years, and his vessel drew but eight feet water; yet in this long interval of sixty-two days he could find no opportunity of getting to sea safely. This is, in itself a commentary upon the dangerous character of the navigation of the mouth of the Columbia."—[Report of Lieut. Niel M. Howison, U. S. N., House of Reps., 30th Congress, 1st Session, Mis. No. 29.

"I lay at anchor in Baker's Bay, some three hundred yards inside the Cape, from November 17, 1846, until January 18, 1847; and although we were unfortunately destitute of barometer and thermometer, we had a good opportunity of observing, during these two winter months, the wind and weather. The heavens were almost always overcast; the wind would spring up moderately at east, haul, within four hours, to south-east, increasing in force and attended with rain. It would continue at this point some twenty hours, and shift suddenly in a hail storm to the south-west; whence, hauling westwardly and blowing heavy, accompanied with hail and sleet, it would give us a continuance of bad weather for three or four days, and force the enormous Pacific swell to break upon the shore with terrific violence, tossing its spray over the tops of the rocks, more than two hundred feet high. A day of moderate weather, with the wind south-east, might succeed this; but before the sea on the bar would have sufficiently gone down to render it passable, a renewal of the south-easter would begin, and go on around the compass as before."—[Ib.

† "A very snug harbor has, within a few years, been sounded out and taken possession of by the Hudson's Bay Company on the south-eastern part of Vancouver's Island. They have named it Victoria, and it is destined to become the most important British seaport contiguous to our territory. Eighteen feet water can be carried into its inmost recesses, which is a fine large basin. There is, besides, pretty good anchorage for frigates out side the basin. The company are making

Monterey and San Francisco are beyond the reach of such surveillance; moreover, they are in a better climate, and are midway our line Pacific coast. They are in a most commanding position. During the naval operations in the Pacific against Mexico, our men-of-war beat out of the harbor of San Francisco in a gale of wind, so easy is it of ingress and egress.

The harbors of California are convenient for, and are even now visited by, our whalemen. Columbia river is not. There is a fleet in the Pacific of 300 vessels, engaged in this business, manned by six or eight thousand of the best seamen of America.

In money and in kind they expend, annually, among the islands and ports of the Pacific, not less than one million of dollars. The facilities which a rail road to California would offer in enabling them to overhaul, refit, and communicate with friends and owners in New England, would attract this whole fleet there; and this vast amount of money would be expended in our own country and among our own citizens, instead of being disbursed, broadcast as it now is, over that wide ocean. As long as there are breakers and a bar at the mouth of the Columbia, there can be in that harbor no attraction for our whale ships.

The coast of California is a favorite place of resort for the whale. They come there to breed.

The chart has two small circles of a radius of 3,000 miles each: one drawn from the mouth of the Columbia, as a centre, the other from Monterey. The latter, from its facilities of ingress or egress, is in a geographical position to command the trade with all the places within these circles, except, perhaps, the ports of British and Russian America. For six months of the year, the difficulties in crossing the bar of the Columbia would place these places nearer to the ports of California by days, if not by weeks and months.

The chart also exhibits the geographical dividing lines of travel and of commerce. The broken line, through the Island of Japan, shows the dividing line of travel from London, by the overland route, to India, and from London through the United States, by rail road from Charleston, via. Memphis, to Monterey. The nearest route to London, from all places to the east of this line, is through the United States; but from all places to the west of it, the nearest route is through the Red Sea and across the Isthmus of Suez. These lines, as before stated, are all drawn without regard to time. They are mere geographical lines, intended to represent distance in *nautical* miles. Were the rail road across the country completed, and the lines drawn with regard to time, they might probably be extended a thousand miles or two further to the westward; for much of the distance to be

this their principal shipping port; depositing, by means of small craft, during the summer, all their furs and other articles for the English market at this place, which is safe for their large ships to enter during the winter season. They no longer permit them to come into the Columbia between November and March."—[Lieut. Howison's Report.

overcome by the overland route is by water, and there is much less rail road traveling by that ronte than there would be by a rail road across the United States. A passenger can accomplish as many miles in two days by rail road, as he can in a week by water.

The other broken line shows the dividing line of travel between London via the overland route, and this part of the country via. the Atlantic and Pacific Rail Road.

The continuous and most westerly line shows the dividing line of commerce between England, on the one hand, and our Pacific ports on the other, supposing the English ships to pass, as they have to do, the Cape of Good Hope.

This line exhibits many interesting facts, consequences, and significations. Among them, it shows that the United States are now in a position which will soon enable them, *geographically*, to command the trade of the entire east; and that, commercially speaking, our country is in the centre of the people of the earth, and occupies a position for trade and traffic with them which no nation that ever existed has held.

Hitherto, in all parts of the world, except Europe and the West Indies, the ships of the two great competitors on the ocean have met on barely equal terms. An American and a British ship met in India, China, New Holland, the islands of the Pacific, or the ports of South America. One was owned in London or Liverpool, the other in some one of our Atlantic ports. To reach home, they both had to pursue the same route and sail the same number of knots. But now that Oregon and California are *Americanized*, all of these ports are nearer; and the chief among them, as Bombay, Calcutta, Singapore, the ports of China, Japan, New Holland, Australia, Polynesia. and the islands of the east, many thousand miles nearer to the United States than they are to England.

TABLE OF DISTANCES BY SEA.

	To England.	*To ports of California.*
From Persian Gulf,	11,300	10,400
" Bombay,	11,500	9,800
" Calcutta,	12,200	9,300
" Singapore,	12,300	7,400
" Canton,	13,700	6,100
" Shanghae,	14,400	5,400
" Jeddo,	15,200	4,500
" New Guinea,	14,000	6,000
" N. W. point of N. Holland,	11,800	7,800
" N. E. " "	13,500	6,900
" New Zealand,	13,500	5,600

From Memphis, a centro point in the immense valley of the West, and one on the great natural and national highway from the Gulf to the Lakes, the distance, via. Panama and the Sandwich Islands, (the usual route,) to China, is 11,700

miles; but by the proposed rail road to Monterey and the great circle, thence to China, the distance is but 6,900 miles.

A rail road across the country, in this direction, would, therefore, it may be observed, shorten the present and nearest practicable route to China near 5,000 miles; it would place us before the commercial marts of *six hundred millions* of people, and enable us, geographically, to command them. Open the needful channels, unbridle commerce, leave it to the guidance of free trade, and who shall tell the commercial destiny of this country!

Rightly and wisely profiting by the advantages which are now opening to us, how long will it be before our sturdy rival will cease to be regarded as such, and when we shall have no competitor for maritime supremacy among nations!

From Monterey to Shanghae is 5,400 miles; midway between the two, and right on the way side, are the Fox or Eleoutian Islands, with good harbors, where a depot of coal may be made for a line of steamers; for the establishment of which, I understand, Mr. King, the Chairman of the Committee of Naval Affairs, is preparing a bill.

Coal has been found on the surface, at San Diego and San Francisco, and Vancouver's* or Quadra Island. Formosa and the Islands of Japan abound with the most excellent qualities of this mineral. Supposing the vessels to be put upon this line to perform not better than the "Great Western," and that the rail road from Charleston, on the Atlantic, be extended to Monterey, on the Pacific, you might then drink tea made in Charleston within the same month in which the leaf was gathered in China.

The passage from Shanghae, allowing a day for coaling at the Fox Islands, can be made in twenty-six days to Monterey, and thence to Charleston by rail road, at the English rate of forty miles an hour, in less than three days.

Hydrographical surveys, and topographical reconnoissances may show San Diego or San Francisco to be the best terminus for the great railway. I have spoken of Monterey merely from its *geographical* position. San Francisco is a better harbor, and has, in its rear, a more fertile country. But whichever of the three be adopted, the selection will not alter the point I have been endeavoring to establish.

A rail road from Charleston to Tennessee is already completed. Memphis is above the yellow fever region of the Mississippi Valley. It is on the great river and in a central position. A road thence would cross the head waters of the Arkansas, the Rio Grande, and the Colorado. It would facilitate the overland trade with Mexico, and perhaps be the principal channel of foreign commerce for her people.

Large amounts of bullion are annually shipped from Western Mexico, in British ships of war, for England. Owing to the route, and the uncertainties as to the

*Excellent coal has been found here. It is used by the English steamers, and is put on board at a mere nominal price.

time when a vessel of war may come for it, it may be assumed that this bullion does not reach England for eight or ten months after it is taken from the mines; during all of which time it is of course idle. Moreover, it pays a freight of 2 per cent. to the British officer and Greenwich Hospital for conveying it in one of Her Majesty's vessels. Now all this bullion would come, as fast as it is taken from the mines, over this road, and would perhaps be coined in our own mints instead of those of Europe.

This route, as compared with one to the Columbia river, is most convenient for a large portion of the citizens of Pennsylvania, all of Delaware, Maryland, Ohio, Indiana, Illinois, Missouri, and all of the States to the south of them; and, considering the present routes, quite as convenient to the people of New England as is the proposed route to the Columbia.

Besides, this last will be obstructed by snow and ice in the winter, the other never. Therefore, California offers the most convenient terminus for the commerce and business of all the States, and the most desirable one for the purposes of the general government.

There is a line of steamers already in operation from Valparaiso, Lima, Guyaquil, and the intermediate ports to Panama.

Under Mr. King's bill of the last Congress, contracts have been made for another line to connect with this, to run to the mouth of the Columbia, touching at Monterey or San Francisco. From Panama to China, via Monterey, is 8,600 miles, and from Panama by water to Monterey is 3,200 miles. Thus it will be observed that the steam communication has already been provided for more than one-third of the distance from Panama to China.

A rail road to Monterey, and a line of steamers thence to China, would place our citizens only half the distance that they now are, and without such rail road must continue to be, from Japan and the Celestial Empire.

The most equitable location of a great national railway, to be constructed for the convenience of all the States, from the banks of the Mississippi to the shores of the Pacific, would be along the line which divides the United States territory west of the Mississippi into two equal parts. The main trunk would then be in the most favorable position for receiving lateral branches from all of the States hereafter to be formed out of that territory. But the ports on the Pacific, and the character of the route, do not admit of such a location.

I have endeavored, as you suggested, to determine the geographical centre of the present *States* of the confederacy.

By one method, Memphis is as near that centre as may be; by the other it falls in Kentucky.

A line drawn diagonally across the States, from the north-east corner of Maine, to the south-west corner of Texas, intersects another from southern Florida to the north-west corner of Iowa, a few miles from Memphis; and Memphis is

just about half way between the mouth of the Mississippi and the head of the Lakes, counting from Lake Michigan.

But if we take two other lines: one dividing the territory comprehended within the States from north to south, the other from east to west, they will cross each other in Kentucky, and about midway a line between Nashville and Louisville. These are the two geographical centres of the States of the Union.

Now, if we take a point about midway between Memphis and Louisville, we shall have what, for practical purposes, may be called the territorial centre of the *States* of the Union. I have marked this point A, on the chart. It is near the mouth of the Cumberland. The centre of population is about the same parallel, but considerably to the eastward.

The great circle from this territorial centre to San Francisco, crosses the Mississippi just above the mouth of the Ohio, and crosses the edge of the Kansas valley. The distance of San Francisco from the Mississippi at this point, is 1,560 *nautical*, or 1,760 statute miles.

Were the country equally favorable, this would certainly be the most advantageous, because it would be the most convenient route for all the States. It will be the business of the topographer, the engineer, and the hydrographer on the Pacific, to determine the most feasible line, and the precise location of this great national highway.

There is, however, another light in which this subject should be considered. A rail road to the Pacific is eminently a military road; and in the selection of a route, and a terminus for it, an eye should be had to its bearings as well to the common defence as to the general welfare.

Vancouver's Island abounds in excellent harbors. Coal of superior quality has recently been found there, cropping out in great quantities on the surface. The English steamers on that coast use it, and pronounce it excellent. The *Cormorant* procured it at four shillings per ton, and took specimens of it to England. It is so accessible that the Indians mine it, and deliver it on board the Hudson's Bay Company's steamers at a mere nominal charge.

That island is in a position which enables the power that holds it to command the Straits of Fuca and the mouth of the Columbia more effectually, even, than Cuba, in the hands of a rival, would control the mouths of the Mississippi. By treaty, Vancouver's Island belongs to the English. In view of these facts, no one with a military eye in his head would think of fixing the terminus of the great national highway, through which we aim to control the trade of the east, under the very guns of our rival. Vancouver's Island enables England to command both the Straits of Fuca and the mouth of the Columbia.

The mouth of that river can never become a naval station of much importance to us. It is too near Vancouver's Island, which is to be the Portsmouth of England in the Pacific. Its approaches are exposed and difficult, its egress dangerous. It is too far from the ports of California, and the coast to be defended.

San Francisco will probably be the centre of our naval operations there. It is in a central, and therefore commanding position. It offers many facilities which Astoria does not. Suppose Cuba belonged to Great Britain, and we were just beginning with a system of national defences for our Atlantic coast: it would be quite as reasonable to expect our ships from Pensacola to pass Havana and protect the coasts of New York, in a war with England, as it would be to expect them to come from the Columbia river, overlooked as it will be by the English from Vancouver's Island, and give security to the ports and coasts of California.

Our Pacific coast is about 1000 miles in length. San Francisco is midway between its southern boundary and Vancouver's Island, and, in a military point of view, is in a position to command eight hundred of the thousand miles; whereas Puget's Sound and Columbia river, owing to the close proximity of Vancouver's Island and the dangerous bars of the river, are incapable of commanding so much as their three marine leagues each.

Respectfully, &c., M. F. MAURY.

Hon. JOHN C. CALHOUN, *U. S. Senate Chamber.*

ART. III—MEMOIR OF A TOUR TO NORTHERN MEXICO,

CONNECTED WITH COLONEL DONIPHAN'S EXPEDITION IN 1846 AND 1847.

BY A. WISLIZENUS, M. D.

THIS is the title of a work of about 140 pages, printed by order of the Senate of the United States.

Since the acquisition of New Mexico and California by the late treaty of peace, the entire country between our present settlements and the Pacific Ocean, is to be viewed in a new and different aspect from that which it before presented. The means of facilitating and rendering more safe the intercourse between the States and our distant settlements, are to be considered; new sources of trade and industry are to be opened; and the broad space between our present settlements and the Rocky Mountains, and thence to the great Ocean, although now considered a desolate waste, is to be occupied by the white man—not in continuous settlements as in the old States; but the agriculturist following up the tributaries of the great rivers, will occupy the vallies; and the herdsman with his flocks occupying the plains, resources will be found to support an immense population, which will in many respects, constitute a peculiar and important national feature.

Henceforth Missouri is not to be regarded as a frontier State; but, possessing within her own limits all the elements of a mighty empire, she is destined to become the heart of the republic.

But let us proceed with our author. In reviewing his labors we shall omit the many interesting incidents and details connected with his journey of several thousand miles by land and water, and groupe into as small a space as practicable, that class of facts which indicate the physical resources of the country through which he traveled, always permitting him to speak for himself where brevity will permit

The objects of his tour are explained in the following paragraph:

"In the spring of 1846, I left St. Louis, Missouri, with the intention of making a tour through northern Mexico and Upper California, and of returning in the fall of the next year. The principal object of my expedition was scientific. I desired to examine the geography, natural history, and statistics of that country, by taking directions on the road with the compass, and by determining the principal points by astronomical observations. I made a rich collection of quite new and undescribed plants. I examined the character of the rocks, to gain insight into the geological formations of the whole country. I visited as many mines as possible, and analyzed some of the ores. I made barometrical observations, to ascertain the elevations above the sea. I kept meteorological tables, to draw general results from them for the climate, its salubrity and fitness for agriculture, and took memoranda in relation to the people—their number, industry, manners, previous history, &c. The intention, in short, for which I started, was to gain information of a country that was but little known. All that I can, therefore, offer the public in the following pages is, what I have sought myself—a collection of matters of fact, related not in the exciting description of an historical novel, but in the plain narrative form of a journal, through which the incidents and adventures of the trip are but occasionally interwoven."

The author describes the country between the western line of Missouri and the crossing of the Arkansas river, a distance according to his account, of some 350 miles, in the following summary:

"Council Grove forms, as it were, a dividing point in the character of the country east and west of it. The country east of it is formed of prairie, with slight ascents and descents—constant undulations, as I might call them; some times larger and fuller, resembling the waves of the ocean, which no doubt once covered those plains, and partly moulded their present form. Of those slight undulations, the barometrical measurements will give evident proof. Big Blue camp was 1,020 feet elevated above the sea; Council Grove is 1,190; and the highest intermediate point is 1,420 feet, on the divide between the waters of the Osage and the Neosho or Grand River. This eastern portion is well watered, and along the water courses sufficiently timbered to sustain settlements. The soil is generally very fertile, and, to judge from the higher elevation, more exempt from fevers, the plague of the bottom land. Let us take a prospective view now of the country west of Council Grove. A short distance west, the country rises

suddenly to the elevation of 1,500 feet, and ascends gradually towards the Arkansas to 2,000 and more feet above the sea. The intermediate country yet exhibits sometimes the short, wave-like form of the eastern portion, but oftener it resembles already the plateaux or high plains between the Arkansas and Cimarron, those representatives of the calm, immense high seas, where the horizon extends further, the soil becomes dryer and more sandy, the vegetation scantier, timber and water more rare. The country between Council Grove and the Arkansas forms the transition to the sandy plains on the other side of the Arkansas; the soil is generally less fertile than in the eastern portion, but all along its water courses (as Cotton-wood Creek, Little Arkansas, Walnut Creek, Ash Creek, Pawnee Fork, and along the Arkansas,) settlements might succeed, though they would have to depend more on stock raising than agriculture."

From the western line of Missouri to Council Grove, a distance of about 123 miles, the country has also been described by others as of rare fertility, and from its elevation promises to be more healthy than the lower portions of the Valley of the Mississippi. It is true that there is a scarcity of timber, but this objection is generally found to be less and less felt as the settlements in prairie regions increase. Some forty miles west of Council Grove the author discovered bog-ore in the prairie, and a great deal of yellow, brown and bluish sandstone, combined with the hydrated oxyde of iron, which he calls ferruginous sandstone." We extract from page nine, the following description of the rocks near the Arkansas river:

"About three miles north of the Arkansas, there is a slight chain of hills in the prairie, mostly overgrown with grass. Attracted by a prairie grave on this elevation, made of a heap of rocks, I was astonished to find these rocks not to be lime or sandstone, but to resemble a volcanic formation; and upon further examination, I discovered the same rock *in situ*, cropping out at the southern end of the hill; the rock is a porous, red, black, and yellow mass, as if earthy substances containing iron had been baked together by strong fire. It shows great similarity to the burnt rocks in the cretaceous formation on the Upper Missouri, specimens of which the late Mr. Nicollet brought back from his expedition; but the latter are blacker and lighter. The character of the rock, as well as of the surrounding country, excludes the idea that it was thrown up from the depths by volcanic action; but it is more likely that it was produced by pseudo-volcanic fires, or subterraneous fires near the surface, ("Erdbraende," as the German geologists call it,) such as are generally called forth by spontaneous or accidental ignition of underlying coal fields.* When, in the evening of the same day, I

* John Bradbury, (Travels in the Interior of America in 1809, '10, and '11: Liverpool, 1817,) p. 153, says: "I observed a vein of fine coal, about eighteen inches thick, in the perpendicular bluff, below the fort—(the Missouri Fur Company's Fort, on the Upper Missouri, above the Mandan village.) On showing some specimens of

found the same formation again on Pawnee Rock, it was in so intimate connexion with the ferruginous sandstone, that it left no doubt in my mind that this scoriaceous rock is the product of action of such fires upon the ferruginous sandstone."

From these indications, it is not improbable that there is an extensive coal-field, stretching in a southern direction, from the Missouri to the Arkansas river, and that iron will also be found in the same region. Should this be the case, these minerals will compensate, to a considerable extent, for the scarcity of timber, and in time, become important sources of wealth to the country. The first notice taken of the ferruginous sandstone is at a point about fifty miles west of Council Grove, and it frequently occurs from this place to the crossing of the Arkansas river, a distance of about 200 miles. At one place within this distance, about thirty miles below the crossing of the Arkansas, the author discovered a bed of *marl* in the bluff of a creek. He says, "the bluffs consist of common sandstone below, and a white, fine grained *marl*, without fossils, above it; this marl also resembles some specimens brought by Mr. Nicollet from the Upper Missouri and belonging to the cretaceous formation."

After crossing the Arkansas, we enter into a region totally destitute of every thing that can give the slightest value to the country. We extract the author's description of this part of the road, and also his reasoning upon the cause of the *mirage:*

"*June* 11.—Traveled about eighteen miles before we halted, without seeing wood or water. Buffalo have entirely disappeared; not even Buffalo chips, the usual substitute for fire wood, were to be seen. The high plain between the Arkansas and Cimarron, whose elevation above the sea is about 3,000 feet, is the most desolate part on the whole Santa Fe road, and the first adventurers in Santa Fe trade stood many severe trials here. Within the distance of sixty-six miles, from the Arkansas to the lower springs of Cimarron, there is not one water course or water pool to be depended upon in the dry season. The soil is generally dry and hard; the vegetation poor; scarcely any thing grows there but short and parched buffalo grass and some cacti. Though the horizon is very distant, there is no shrub or tree to fix your eye upon, and no other game attracts your attention except once in awhile a wild antelope, which is apt to allure you to a useless chase. But, for one quality this desert is distinguished. When your patience has been worn out by the long ride, and by the monotonous sameness of the

it to some of the hunters in the fort, they assured me it was a very common substance higher up the river, and that there were places on which it was on fire. As pumice is often found floating down the Missouri, I have made frequent inquiries of the hunters if any volcano existed on the river or its branches, but could not procure from them any information that would warrant any such conclusion. It is probable, therefore, that this pumice stone proceeds from these burning coal beds."

scenery; when your lips are parched from thirst, and a friend at your side, in cruel consolation, reminds you of the luxuries of cultivated life—to all of which you would nevertheless prefer a refreshing draught of cold water—there emerges in the plain before your astonished eyes, a beautiful lake. Its surface looks like crystal; the wind moves but slightly the wide sheet of water; but the faster you hurry forward, the nearer you approach it, the sooner you will be disenchanted; the lake disappears again before your presence; and when you arrive at the very spot, you perceive nothing but the same hard, dry, parched soil, over which you have traveled all day. This is the celebrated "*mirage*," (*false ponds; fata morgana.*) Though it also appears in other parts of the prairie, it is nowhere so common, so deceptive, and so well developed, as here. In examining the causes which produce it at this high plain, I have arrived at the following conclusions:

"The phenomenon of mirage requires—

1. A wide high plain, with extensive horizon, and but slight undulations of the ground.

2. A dry, hard ground, either quite barren, or but coated with parched and isolated vegetation, like the short buffalo grass.

3. Dry and warm weather, with a clear sky. On such days, and less in the morning and evening, but rather when the sun has the most power, mirage is the most frequent and the plainest.

4. A slight hollow in the undulating plain, however insignificant it may be, producing a background. Where this low background is interrupted by the horizon, on that place the mirage grows more dim and disappears entirely.

5. The distance of several miles from the stand of the observer. The nearer one approaches, the more indistinct becomes the mirage, and it changes at last into a glimmering of the air, such as can be seen on hot summer days upon dry, solid, macadamized roads, from which the rays of the sun are powerfully reflected.

6. The mirage is, therefore, the effect of a strong reflection of the rays of the sun from the ground, seen out of a certain distance, on certain localities.

7. That objects, being near the mirage, as trees, animals, men, &c., are seen double, can also be explained by the following law of reflection.

"When two strata of air, one of common middle temperature and density, and the hotter, meet together, an observer, standing also in a common temperature and looking at an object near where the two strata meet, will see that object double, directly in the stratum of common air, in which he stands himself, and indirectly by reflected light in the hotter stratum. The direct image will stand upright; the reflected one inverted."

In following the author from the Arkansas to the Colorado, the principal branch of the Canadian, a distance of about 250 miles by the road, we find nothing to authorize the opinion that the country is of scarcely any value for either agricultural or grazing purposes. He says that

"the Rio Colorado is a clear mountain stream, with fine grass and good soil; cedars grow on the neighboring hills, and further down on the creek. A settlement would succeed very well here."

The first settlement on the route is at Rio Mora, about sixty miles from the Colorado, and is thus described:

"About eight miles from Wolf creek we reached the *Rio Mora*, a fine mountain stream, and a charming valley was spreading out before us. Soil, grass, and water are excellent; the surrounding mountains furnish an abundance of pine, and protect the valley at the same time from severe cold in the winter. Stock increases here very fast; nevertheless, there are very few settlements at present in this part of the valley, because they are constantly exposed to the depredations of Indians. We stopped a short time at the first settlement, belonging to Messrs. Smith and Wells. The house (quite a new sight to us since we had left Missouri) was built in the Mexican fashion of sun-dried bricks or *adobes*, and with a flat roof. Delicacies of milk, butter, and pie were offered to us, and of course not refused."

From here it is about ninety miles by the meanderings of the road through the mountains to Santa Fe. And having arrived at Santa Fe, the author gives an account of the geography, climate, history, statistics, &c., of the country, from which we make the following copious extracts:

"New Mexico is a very mountainous country, with a large valley in the middle, running from north to south, and formed by the *Rio del Norte*. The valley is generally about twenty miles wide, and bordered on the east and west by mountain chains, continuations of the Rocky Mountains, which have received here different names, as Sierra Blanca, de los Organos, oscura, on the eastern side, and Sierra de los Grullas, de Acha, de los Mimbres, towards the west. The height of these mountains south of Santa Fe may, upon an average, be between six and eight thousand feet, while near Santa Fe, and in the more northern regions, some snow covered peaks are seen that may rise from 10,000 to 12,000 feet above the sea. The mountains are principally composed of igneus rocks, as granite, sienite, diorit, basalt, &c. On the higher mountains excellent pine timber grows; on the lower, cedars, and sometimes oak; in the valley of the Rio Grande, mezquite.

"The main artery of New Mexico is the Rio del Norte, the longest and largest river in Mexico. Its head waters were explored in 1807 by Captain Pike, between the 37° and 38° north latitude; but its highest sources are supposed to be about two degrees farther north, in the Rocky Mountains, near the head waters of the Arkansas and the Rio Grande, (of the Colorado of the west.) Following a generally southern direction, it runs through New Mexico, where its principal affluent is the Rio Chamas from the west, and winds its way then in a southeastern direction through the States of Chihuahua, Coahuila and Tamaulipas,

to the Gulf of Mexico, in twenty-five degrees, fifty-six minutes north latitude. Its tributaries in the latter States are the Pecos, from the north; the Conchos, Salado, Alamo, and San Juan, from the south. The whole course of the river, in a straight line, would be near 1,200 miles; but by the meandering of its lower half, it runs at least about 2,000 miles, from the region of eternal snow to the almost tropical climate of the gulf. The elevation of the river above the sea near Albuquerque, in New Mexico, is about 4,800 feet; in El Paso del Norte about 3,800; and at Reynosa, between three and four hundred miles from its mouth, about 170 feet. The fall of its water appeared to be, between Albuquerque and El Paso, from two to three feet in a mile, and below Reynosa one foot in two miles. The fall of the river is seldom used as a motive power, except for some flour mills, which are oftener worked by mules than by water. The principal advantage which is at present derived from the river is for agriculture, by their well managed system of irrigation. As to its navigation in New Mexico, I doubt very much if even canoes could be used, except perhaps during May or June, when the river is in its highest state, from the melting of the snow in the mountains. The river is entirely too shallow, and interrupted by too many sand bars, to promise any thing for navigation. On the southern portion of the river the recent exploration by Captain Sterling, of the United States steamer Major Brown, has proved that steamboats may ascend from the gulf as far as Laredo, a distance of 700 miles. Although said steamboat did not draw over two feet of water, yet the explorers of that region express their opinion, that 'by spending some $100,000 in a proper improvement of the river above Mier, boats drawing four feet could readily ply between the mouth of the Rio Grande and Laredo.' Whenever a closer connexion between this head point of navigation and New Mexico shall be considered, nothing would answer but a rail road, crossing from the valley of the Rio Grande to the high table land in the State of Chihuahua.

"The *soil* in the valley of the Rio del Norte, in New Mexico, is generally sandy and looks poor, but by irrigation it produces abundant crops. Though agriculture is carried on in a very primitive way, with the hoe alone, or with a rough plough, made often entirely of wood, without any particle of iron, they raise large quantities of Indian corn and wheat, beans, onions, red peppers, and some fruits. The most fertile part of the valley begins below Santa Fe, along the river, and is called "rio abajo," or (the country) down the river. It is not uncommon there to raise two crops within one year. The general dryness of the climate, and the aridity of the soil in New Mexico, will always confine agriculture to the valleys of the water courses, which are as rare as over all Mexico—such, at least, as contain running water throughout the year. But this important defect may be remedied by Artesian wells. On several occasions I remarked on the high table-land from Santa Fe south, that in a certain depth layers of clay are found, that may form reservoirs of the sunken water-courses from the eastern and western mountain chain, which, by the improved method of boring, or Arte-

sian wells, might easily be made to yield their water to the surface. If experiments to that effect should prove successful, the progress of agriculture in New Mexico would be more rapid, and even many dreaded "Jornadas" might be changed from waterless deserts into cultivated plains. But at present, irrigation from a water course is the only available means of carrying on agriculture. The irrigation is effected by damming the streams and throwing the water into larger and smaller ditches (*acequias*) surrounding and intersecting the whole cultivated land. The inhabitants of towns and villages, therefore, locate their lands together, and allot to each one a part of the water at certain periods. These common fields are generally without fences, which are less needed, as the grazing stock is guarded by herdsmen. The finest fields are generally seen on the *haciendas*, or large estates, belonging to the rich property holders in New Mexico. These haciendas are apparently a remnant of the old feudal system, where large tracts of land, with the appurtenances of Indian inhabitants as serfs, were granted by the Spanish crown to their vassals. The great number of human beings attached to these haciendas are, in fact, nothing more than serfs; they receive from their masters only food, lodging, and clothing, or perhaps a mere nominal pay, and are therefore kept in constant debt and dependence to their landlords; so that if old custom and natural indolence did not prevail upon them to stay with their hereditary masters, the enforcement of the Mexican laws against debtors would be sufficient to continue their servitude from generation to generation. This actual slavery exists throughout Mexico, in spite of its iberal constitution; and as long as this contradiction is not abolished, the declamations of the Mexican press against the slavery in the United States must appear as hypocritical cant.

"Besides agriculture, the inhabitants of New Mexico pay a great deal of attention to the raising of stock, as horses, mules, cattle, sheep, and goats. Their stock is all rather of a small size, because they care very little for the improvement of the breed; but it increases very fast, and as no feeding in stables is needed in the winter, it gives them very little trouble. There are large tracts of land in New Mexico, too distant from water to be cultivated, or in too mountainous parts, which afford, nevertheless, excellent pasturage for millions of stock during the whole year; but unfortunately here, as well as in the State of Chihuahua, the raising of stock has been crippled by the invasions of the hostile Indians, who considered themselves secret partners in the business, and annually take their share away.

"A third much neglected branch of industry in New Mexico are the *mines*. Great many now deserted mining places in New Mexico prove that mining was pursued with greater zeal in the old Spanish times than at present, which may be accounted for in various ways, as the present want of capital, want of knowledge in mining, but especially the unsettled state of the country and the avarice of its arbitrary rulers. The mountainous parts of New Mexico are very rich in gold, copper, iron, and some silver. Gold seems to be found to a large extent in

all the mountains near Santa Fe, south of it in a distance of about 100 miles, as far as Gran Quivira, and north for about 120 miles up to the river Sangre de Cristo. Throughout this whole region gold dust has been abundantly found by the poorer classes of Mexicans, who occupy themselves with the washing of this metal out of the mountain streams. At present the old and the new *Placer*, near Santa Fe, have attracted most attention, and not only gold washes, but some gold mines too, are worked there. They are, so far as my knowledge extends, the only gold mines worked now in New Mexico. But as I have made from Santa Fe an excursion there for the special purpose of examining those mines, I must refer the reader, in relation to them, to that chapter of my narrative. As to the annual amount of gold produced in New Mexico, I am unable to give even an estimate. But as nearly all the gold of New Mexico is bought up by the traders, and smuggled out of the country to the United States, I believe that a closer calculation of the gold produced in New Mexico could be made in the different mints of the United States than in Mexico itself.* Several rich silver mines were, in Spanish times, worked at Avo, at Cerrillos, and in the Nambe mountains, but none at present. Copper is found in abundance throughout the country, but principally at las Tijeras, Jemas, Abiquiu, Guadelupita de Mora, etc. I heard of but one copper mine worked at present south of the Placers. Iron, though also abundantly found, is entirely overlooked. Coal has been discovered in different localities, as in the Raton mountains, near the village of Jemez, southwest of Santa Fe, in a place south of the Placers, etc. Gypsum, common and selenite, are found in large quantities in Mexico; most extensive layers of it, I understood, exist in the mountains near Algodones, on the Rio del Norte, and in the neighborhood of the celebrated "Salinas." It is used as common lime for white washing, and the crystalline or selenite instead of window glass. About four days traveling, (probably one hundred miles,) south-southeast of Santa Fe, on the high table land between the Rio del Norte and Pecos, are some extensive *salt lakes*, or '*salinas*,' from which all the salt, (muriate of soda,) used in New Mexico is procured. Large caravans go there every year from Santa Fe in the dry season and return with as much as they can transport. They exchange, generally, one bushel of salt for one of Indian corn, or sell it for one, and even two dollars a bushel.

"Not far from these salinas the ruins of an old city are found, of the fabulous '*la Gran Quivira*.' The common report in relation to this place is, that a very large and wealthy city was once here situated, with very rich mines, the produce of which was once or twice a year sent to Spain. At one season, when they were making extraordinary preparations for transporting the precious metals, the Indians attacked them; whereupon the miners buried their treasures, worth fifty

* At pages 32–3 the author says: "The annual production of gold in the two *Placers* seems to vary considerable. In some years it was estimated from $30,000 to $40,000 per annum; in others, from $60,000 to $80,000, and in latter years even as high as $250,000 per annum."

millions, and left the city together; but they were all killed except two, who went to Mexico, giving the particulars of the affair, and soliciting aid to return. But the distance being so great and the Indians so numerous, nobody would advance, and the thing was dropped. One of the two went to New Orleans, then under the dominion of Spain, raised five hundred men and started by way of the Sabine, but was never heard of afterwards. So far the report. Within the last few years several Americans and Frenchmen have visited the place; and, although they have not found the treasure, they certify at least to the existence of an acqueduct, about ten miles in length, to the still standing walls of several churches, the sculptures of the Spanish coat of arms, and to many spacious pits, supposed to be silver mines. It was no doubt a Spanish mining town, and it is not unlikely that it was destroyed in 1680, in the general, successful insurrection of the Indians in New Mexico against the Spaniards. *Dr. Samuel G. Morton*, in a late pamphlet, suggests the probability that it was originally an old Indian city, into which the Spaniards, as in several other instances, had intruded themselves, and subsequently abandoned it. Further investigation, it is to be hoped, will clear up this point.

"The *climate* of New Mexico is, of course, very different in the higher, mountainous parts, from the lower valley of the Rio del Norte; but generally taken, it is temperate, constant, and healthy. The summer heat in the valley of the river will sometimes rise to nearly 100° Fahrenheit, but the nights are always cool and pleasant. The winters are much longer and more severe than in Chihuahua, the higher mountains are always covered with snow, and ice and snow are common in Santa Fe; but the Rio del Norte is never frozen with ice thick enough to admit the passage of horses and carriages, as was formerly believed. The sky is generally clear, and the atmosphere dry. Between July and October, rains fall; but the rainy seasons are here not so constant and regular as in the southern States. Disease seems to be very little known, except some inflammations and typhoidal fevers in the winter season."

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"The whole *population* of New Mexico was, in 1793, according to a census, 30,953; in 1833 it was calculated to amount to 52,360, and that number to consist of 1.20 Gapuchines, (native Spaniards,) 4.20 Creoles, 5.20 Mestizes of all grades, and 10.20 of pueblo Indians. In 1842, the population was estimated at 57,026, and at present at about 70,000 souls."

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"The *rulers of New Mexico*, under the Mexican government, used to be a governor and a legislative power, (junta departmental,) but as the latter was more a nominal than a real power, the governor was generally unrestrained, and subject only to the law of revolution, which the New Mexicans used to administer very freely, by upsetting the gubernatorial chair as often as the whole Republic did that of the President. Governor Armijo, the last ruler of New Mexico, before

it was invaded by the Americans, has already received his full share of comment from the public press. He is one of those smart, self-confident men, who, like their prototype Santa Anna, are aware that the wheel of fortune is always turning, and that the Mexicans are a most credulous and easily deceived people; and though at present he is a fugitive from his country, and subdued, I have no doubt he will, before long, appear once more on the stage, and by some means come into power again. The judiciary power in New Mexico has always been as dependent as the governor was independent. Besides that, the clergy, as well as the military class, had their own courts of justice. In relation to the general government of Mexico, New Mexico has always maintained greater independence than most of the other States—partly from its distance from Mexico, and partly from the spirit of opposition in the inhabitants, who derived very little benefit from their connexion with the Republic, and would, therefore, not be taxed without an equivalent. Several times the general government tried to introduce in New Mexico the so called estanquillas, or the sale of tobacco in all its forms, as a monopoly of the general government; but it never succeeded. In the same way the introduction of copper coin was resisted. This loose connexion with the mother country will aid a great deal its annexation to the United States, provided, that the latter will bestow upon it what the Mexican government never could—stability of government, safety of property and personal rights, and especially protection from the hostile Indians.

"*Santa Fe* is one of the oldest Spanish settlements in New Mexico; its origin dates, probably, as far back as the end of the sixteenth century. It lies in 35 deg., 41 min., 6 sec., north latitude, and 106 deg., 2 min., 30 sec., longitude west of Greenwich.* Its elevation above the the sea, according to my own observations, is 7,047 feet.

"Santa Fe lies in a direct line about twenty miles east of the Rio del Norte, in a wide plain, surrounded on all sides by mountains. The eastern mountains are the nearest; those towards the northeast, the Taos mountains, the highest; some of their snow-capped peaks are supposed to be from four to five thousand feet higher than Santa Fe. A small creek, that comes from the eastern mountains, provides the town with water, and runs about twenty-five miles south-west from it into the Rio del Norte. There is no timber on the plains, but the mountains are covered with pine and cedar. The soil around Santa Fe is poor and sandy; without irrigation, scarcely anything can be raised. There is no good pasturage

* This is the result of the most numerous astronomical observations made by Lt. Emory, of the engineer corps, during his stay in Santa Fe, and which he has kindly allowed me to refer to. The result of my own observations for latitude, made during my short sojourn in Santa Fe, differs from his but in seconds. Dr. J. Gregg had already determined it as in 35 deg., 41 min. There can, therefore, be no doubt as to the real latitude of Santa Fe. Nevertheless, all the Mexican maps have generally laid it nearly one degree further north. This northern tendency of Mexican maps I observed on many other points where I made observations for latitude.

on the plains; stock is generally sent to the mountains, and only asses, mules, and goats—the stock of the poorer classes—are kept near the settlements.

"The climate of Santa Fe is rather pleasant; not excessively warm in the summer, and moderately cold in the winter, though snow is a common occurrence. Nearly all the year the sky is clear, and the atmosphere dry. All the houses in Santa Fe are built of adobes, but one story high, with flat roofs; each house in a square form, with a court or open area in the centre. The streets are irregular, narrow, and dusty. The best looking place is the 'plaza,' a spacious square, one side of which the so called palacio, the residence of the Governor, occupies. The palace is a better building than the rest; it has a sort of portico, and exhibits two great curiosities, to-wit: windows of glass, and festoons of Indian ears. Glass is a great luxury in Santa Fe; common houses have shutters instead of windows, or quite small windows of selenite, (crystalized gypsum.) The festoons of Indian ears were made up of several strings of dried ears of Indians, killed by the hired parties that are occasionally sent out against hostile Indians, and who are paid a certain sum for each head. In Chihuahua, they make a great exhibition with the whole scalps of Indians which they happen to kill by proxy; the refined New Mexicans show but the ears. Among the distinguished buildings in Santa Fe, I have to mention yet two churches with steeples, but of very common construction.

"The inhabitants of Santa Fe are a mixed race of Spanish and Indian blood, though the latter prevails. The number of inhabitants was, in former times, reported as high as 4,000; at present it contains at most 3,000; and with the surrounding settlements belonging to the jurisdiction of Santa Fe, about 6,000. The manners and customs of the inhabitants of Santa Fe are those of whole Northern Mexico; they are indolent, frugal, sociable, very fond of gambling and fandangos, and the lower classes, at least, exceedingly filthy. As in most Mexican towns, I was at a loss to find out by what branch of industry the mass of the people support themselves; and I came at last to the conclusion, that if from natural indolence they work as little as possible, their extreme frugality, too, enables them to subsist upon almost nothing."

Although we have already drawn very largely from the author, we should not do justice to his labors without publishing his summary of the various geological observations, spread over the whole extent of the journal. At page 135 he says:

"Independence, near the western frontier of the State of Missouri, is situated in the great Missouri coal basin, which occupies more than one-third of that State.

"The first rock in situ which I saw in the prairie, after leaving Independence, was on Rock Creek, about seventy-nine miles from Independence. It was a yellow-brownish compact limestone, with encrinites, and similar fossils of the carboniferous limestone, as found in Missouri.

"On Pleasant Valley creek, (125 miles,) the bluffs are formed by two different

limestones: the one is white and compact—the other grayish, soft, and argillaceous. The first contained some indistinct fossils, but in too imperfect a state to determine what formation they indicate.

"In Council Grove, (143 miles,) a horizontal, grayish, argillaceous limestone prevails, without fossils.

"Leaving Cotton-wood creek, (185 miles,) irregular heaps of bog-ore are seen in the prairie, and a ferruginous sandstone of yellow, brown and blue color, extends from here to Pawnee Fork, a distance of about one hundred miles.

"The bluffs of the Little Arkansas consisted of a spotted, yellow, calcareous sandstone, and isolated pieces of ferruginous sandstone.

"Between Camp Osage, (the first camp near the Arkansas river,) and Walnut Creek, (263 miles,) I met with a very porous and scoriaceous rock in situ, apparently the product of action of subterranean fires upon the ferruginous sandstone. Most likely a large coal-field lying beneath here has become ignited, and produced this change of the rock. The so called Pawnee Rock, (between Walnut creek and Ash Creek,) consists of the same ferruginous sandstone, changed by fire. On Pawnee Fork, (292 miles,) I saw the last of it; the ferruginous sandstone there was more compact, and deep red.

"On a branch of Big Coon creek, (332 miles,) I found the bluffs to consist of common sandstone below, and a white, fine grained-marl above it. This marl resembles very much some of the cretaceous formation of the Upper Missouri; but finding no fossils, I could not ascertain it.

"Two miles beyond that place (341 from Independence,) I had the first chance to examine the bluffs on the Arkansas; it was a grayish, conglomerated limestone, with a few small fossils, that were rather imperfect, but seemed to belong to the cretaceous formation. The neighborhood of the above mentioned marl raises this presumption nearly to certainty. I have, therefore, not hesitated to lay it down as cretaceous formation. About 20 miles higher up on the Arkansas, I saw, upon a second examination, but a coarse conglomerate of sand and limestone. At the usual fording place (373 miles,) where I left the Arkansas for the Cimarron, no rocks were in situ.

"Having crossed the Arkansas, I met with the first rocks again, on the 'middle springs of Cimarron,' (468 miles;) it was a sandy limestone above common sandstone.

"Six miles west of the Crossing of Cimarron (500 miles from Independence,) light bluffs rise in the prairie of a yellow, reddish, and spotted sandstone, combined with lime and argile.

"A few miles beyond them a large, isolated mountain of boulders stands in the plains, composed of heavy blocks of quartz and quartzose sandstone, and many erratic rocks were afterwards found on our road.

"On Cedar creek, McNees' creek, and Cotton-wood branch, a yellow sandstone prevailed.

"On Rabbit-ear creek I met for the first time with amygdaloidal basalt, a black, heavy, basaltic rock, with a great many irregular, vesicular cavities, that are generally hollow—sometimes, too, filled with lime; in rare instances, with olivin. This rock is most common throughout the high mountains of Mexico. It occurs in most irregular masses, in whole mountains, as well as in millions of pieces strewn over the surface of the country. Here it rose in high perpendicular walls, as bluffs of the creek, and a very compact quartzose sandstone was below in horizontal layer.

"The Round Mound, a mountain in the prairie, about three miles further west, which I ascended, is formed of a brown, decomposed basaltic rock.

"On Rock creek, and Whetstone creek, the amygdaloidal basalt with underlying sandstone was found.

"In going from there to 'Point of Rocks,' (600 miles,) extensive strata of a yellow, compact quartzose sandstone are passed, dipping gently towards the east. Point of Rocks itself, a spur of the western mountains, is a mass of sienite.

"Some twelve miles beyond it, rises a hill in the plains, composed of very compact, black basalt, with underlaying white sandstone.

"The bed and bluffs of the Rio Colorado and Ocate creek (627 miles,) are formed by quartzose sandstone.

"The Wagon mound, an isolated mountain in the high plain, consists of a compact, black, and spotted basalt, rising in columnar shape.

"On Wolf creek (664 miles) the amygdaloidal basalt and quartzose sandstone reappeared, both in horizontal layers.

"Reaching the Galinas creek, near las Vegas, (690 miles,) I met, after a long interval, with limestone again. It was a dark blue, with casts of Inoceramus of the cretaceous series.

"From here we penetrated into the very heart of the mountains. At first we met but with standstone, common and quartzose, and of most different colors.

"Near San Miguel (707 miles,) a coarse conglomerate was found of decomposed granite, sandstone, and lime, and large blocks of decomposed granite lined the Pecos river, opposite the old Pecos village, (737 miles.)

In the canon leading from here to Santa Fe, at first sandstone is found, common, quartzose, and calcareous, of various colors and granulations, till about 15 miles from Santa Fe, granite in situ appears, and continues all the way to Santa Fe. Near where I met for the first time with granite in situ, the sandstone, if I may judge from a very limited examination, was suddenly uplifted and thrown back in an angle of nearly 100 degrees.

"West of Santa Fe, granite seems also to prevail. In my excursion to the Placers, southwest of Santa Fe, I found sandstone below, and on the height of the mountains granite and trap rocks.

"In the mountains of that neighborhood, common limestone and sulphate of lime are said to exist; but on the road over which I traveled I had no chance to see any.

"Granitic and trap formations seem to predominate, too, in the valley of the Rio del Norte below Santa Fe; but as the road leads always along the river, and as the mountains on either side are generally about ten miles distant, I could not examine them as I wished to do, and had often to depend alone upon the external form of the mountain chain, apparently indicating unstratified and igneous rocks. Whenever the mountains approached the river, I gained more information. So, for instance, I found between Joyita and Joya, (about 115 miles from Santa Fe,) quartzose sandstone and quartz in a spur of the eastern mountain chain; and in Joyita itself, bluffs near the river of amygdaloidal basalt.

"Some miles west of Socorro, (140 miles,) on the right bank of the river, I examined the western mountains, and found porphyritic and trachitic rocks.

"Near the ruins of Valverde, (165 miles,) I met with bluffs of a dark brown, nodular sandstone; and about eight miles beyond, with amygdaloidal basalt again.

"In the Jornada del Muerto granitic and basaltic formation, to judge from their shape, exists in the distant mountain chains; part of them in the eastern chains is called, for their basaltic appearance, Organ mountains.

"Below Donana I perceived some primitive rocks again, near the river, resembling a decomposed porphyry.

"The mountains above El Paso belong mainly to the trap formation.

"During my short stay in El Paso I made an excursion to the south-western mountains of the valley, and was rather astonished to find mountains of limestone. The foot of the mountains was formed by a horizontal quartzose sandstone, similar to that underlayin g the amygdaloidal basalt. The very compact and gray limestone, intersected with many white veins of calcspar, rose upon it to the crest of the mountains; but on several places, granite and greenstone seemed to have burst through it and formed partial eruptions. After a long search I discovered some fossils, and though much injured and imperfect, they are, nevertheless, sufficient to determine the age of this formation. The fossils are a coral: *Calamopora*, and a bivalve shell of the genus *Pterinea*. This limestone is, therefore, a Silurian rock. Several mines have formerly been worked in it.

"On the road from El Paso to Chihuahua, I met in the first day or two with the same limestone. The pieces lying on the road were generally surrounded with a white crust of carbonate of lime; pieces, too, of what appeared to be fresh-water limestone, occurred. It is rather probable that this is the same material as the white crust of the blue limestone, and that both are the result of calcareous springs.

"About fifty miles south of El Paso, the limestone seems to cease, and porphyritic rocks, of the most varied colors and combinations, continued from here as far as Chihuahua, interrupted sometimes only by granitic rocks. The base of the porphyry is generally felspar.

"Around Chihuahua and some distance to the south and west of it, in the

Sierra Madre, porphyritic rocks predominate, and valuable mines are found in them.

"Near Chihuahua, I understood, about twelve miles northeast of it, mountains of limestone appear; and through the favor of Mr. Potts, in Chihuahua, I received a piece of limestone from there, containing some casts of the chambers of an Orthoceras, proving that this limestone belongs also to the Silurian system. Mines are also found in it.

"Another fossil I received in Chihuahua, said to come from limestone near Corralitas, a mining place about 250 miles northwest of Chihuahua. It is a Pecten quinquecostatus, (Sowerby,) of the cretaceous series; but not having traveled through that part of the State, I am not able to give any comment upon it.

"From Chihuahua to Matamoros, traveling with the army as a surgeon, my time was so occupied that I could not make any distant excursions from the road; but generally, too, the geology of the country seemed to be very uniform and uninteresting.

"From Chihuahua some distance south, the porphyritic rocks continued. In Saucillo, (70 miles from Chihuahua,) I perceived the first limestone again. From there to Santa Rosalia I passed some hills of amygdaloidal basalt, but the main chain of the mountains was all limestone, and continued to be so throughout the whole eastern ramification of the Sierra Madre, over which we traveled from here down to Saltillo and Monterey, where the low country begins. This limestone forms steep, often rugged mountains, rising on an average 2,000 feet above the plain; it is metaliferous, and has all the appearance of the Silurian limestone found at El Paso and Chihuahua, but I was never able to discover any fossils on this route. Silver and lead mines are of various occurrence in it; in the limestone surrounding Cadena, coal has been found, I was informed, but I had no time to verify it.

"From Monterey to the sea shore I made but one interesting discovery—near Mier. On the bank of the Alamo river, about four miles above its mouth into the Rio Grande, I found an extensive bed of large fossil shells of Ostrea, belonging to the cretaceous formation. As the same formation has lately been discovered by Dr. Rœhmer, of Berlin, as extending in Texas from San Antonio to the Brazos, this cretaceous bed near Mier is, in all probability, a continuation of it. In looking over the recent publication of 'Notes of the upper Rio Grande, by Bryan Tilden,' I found, in a description of the river bank of the Rio Grande below Laredo, that 'entire hills are to be seen, composed almost wholly of what appears to be a collection of large sea oyster-shells.' I presume, therefore, that the same cretaceous formation extends in this direction higher up on the Rio Grande."

The Geology, the Flora, and Meteorology of a given region must all be known before we can form a correct estimate of its value, and capacity of supporting man in a state of civilization. To each of these subjects the author industriously

devoted his attention. His botanical collections are very extensive. After his return they were submitted to Dr. G. Engleman, an accomplished botanist of this city, who has described a number of new varieties that will be found interesting to those who delight in the beauties of nature.

The meteorological table is very complete, and constitutes an important and interesting portion of the work, as well to the agriculturist as to such as may desire to visit that region in search of health, but its great length prevents us from publishing it at present. In examining the table which embraces the time that the author was in the valley of the Rio del Norte above El Paso, we have found the temperature much higher than we had supposed it to be in that region. He reached Santa Fe on the 30th of June, and from that date to the 8th of August, the time of his arrival at El Paso, say thirty-nine days, we find twenty-seven days on which the thermometer reached 80 degrees Fahrenheit. One day it stood at 90 degrees and ten days above, and twice it reached 96.5 degrees. The lowest point noted during this period of thirty-nine days, is 60 degrees, which is reported at sunrise on the 19th of July. The mean temperature is not calculated, but we imagine that it will be found equal to that of the southern States during the same period.

Besides a map of the country and a geological sketch, the book contains a profile of elevations above the level of the sea, including the entire route from Independence to Reynosa.

This, in a national point of view is, perhaps, the most useful branch of the author's labors, and was of itself of sufficient importance to have authorized the government to send out a party to perform the work. The observations were taken at about one hundred and sixty-six points.

We can only notice a few of the principal places: St. Louis is 420 feet above the level of the ocean; Independence 1,040; Council Grove 1,190; Crossing of the Arkansas 2,703; Crossing of Cimarron 3,830; Rio Colorado 5,642; Santa Fe 7,047; Rio del Norte, three miles north of Albuquerque, 4,813; El Paso 3,814; Chihuahua 4,640; Cotton-wood branch camp, about twenty miles this side of Santa Fe, 7,250 feet. This is the highest point on the route.

The author was disappointed in his original design of visiting Upper California, by the war—which broke out after his departure on his tour—and being detained six months, as he says, in a very passive situation by the arbitrary government of Chihuahua—after the taking possession of that State by our troops he accepted a situation in the medical department of the army, under the command of Colonel Doniphan, and returned by the way of Monterey to the States. Although diverted from his route, yet he was true to the cause of science, and while performing other duties, and controlled by the movements of one of the most extraordinary campaigns, in some respects, upon record, he still continued his scientific observations. We sincerely trust that so much zeal for the cause of

science, and so much labor performed by a private individual for the public benefi will meet with a just reward.

In concluding this hasty and imperfect notice of the labors of the author, thet inquiry naturally arises, what benefit will the country derive from the acquisition of New Mexico, and what effect is likely to be produced upon the economy of the older States by our possessions in that remote and isolated region? While we feel incompetent to give a satisfactory answer to this inquiry, we will, nevertheless, take a cursory view of the resources of that country, and of the probable influence which its new relations to this, will exert upon both.

The physical character of New Mexico plainly indicates the division of labor there into three departments, viz: Agriculture, grazing and mining. Owing to the limited quantity of fertile soil, and the necessity of irrigation, although agriculture may be profitable, it can never become very extensive; and even if the country was more favorable for this branch of industry, yet, owing to its location, the raw material could not find a market abroad, at prices which would authorize its transportation. The extensive regions abounding in natural pasturage, affords a vast field of employment; and if a fair market can be obtained for stock, this will, in time, become an extensive source of wealth. But the prosperity of both these branches of industry, depends upon the mines. Without this resource the commerce of New Mexico with other States, must remain very limited, and lacking that stimulus to industry which arises from remunerating prices, the progress of civilization will be slower there than perhaps in any other portion of the United States. But should mining prove successful, as we have reason to suppose it will, the valley of the Rio del Norte is destined to be one among the most wealthy, and in many respects, the most interesting portions of the Union. Completely protected against foreign competition, by its isolated location, the farmers would obtain prices for their products that would encourage the improvement of every acre of land that could be irrigated, until it would become as a cultivated garden in the bosom of the mountain, surrounded by scenery unsurpassed, perhaps, by any on the globe, and blessed with a climate at once delightful and salubrious. Possessing such attractions, it could not fail to draw wealth and all the refinements of a high state of civilization, from other parts of the country.

The production of the precious metals, to a considerable extent, in New Mexico, would be highly beneficial to the other States, especially so long as our foreign commerce continues so large as at present. A regular supply of five to ten million dollars from the mines would go far to protect the country against revulsions growing out of foreign trade; and as a considerable portion of this money would doubtless enter into the circulation of the Western States, it would give impulse to the development of their resources and strengthen them against the money power of the east.

Believing as we do, that the value of New Mexico to the other States will de-

pend mainly upon the productiveness of its mines, we trust that our government will, without delay, adopt proper measures for a thorough geological survey of the country, and also establish some mode of disposing of the lands that will offer encouragement to both capital and enterprize.

ART. IV—PLANK ROADS.

We are indebted to Philo White, Esq., for a copy of a Report on Plank Roads, submitted by him to the Legislature of Wisconsin. This document furnishes a more full and complete exposition of the advantages of this description of roads, than we have before met with. The first question considered is, what kind of roads are best adapted to the present wants of the community? And though rail roads are admitted to afford the greatest facilities under particular circumstances, yet it is concluded that there are many situations where a class of thoroughfares less costly, "and more practical *for every day use*," are called for.

The advantages of plank roads, over McAdam or stone roads, are, that the former can be made in all situations, without regard to the character of the soil; that they are less liable to be affected by frost, (which is sometimes very injurious to M'Adam roads;) and that they can be built and maintained at much less cost. It is calculated that horses will travel with wheel vehicles, one-fifth faster, and draw one-fifth more weight on a plank than on a stone road. "In fine," (says the report,) "plank roads are preferable to those of McAdamized stone in cheapness, in case of draught and in comfort to passengers; greater speed being attainable on them with less assistance to draught; and stage owners say that they are less fatiguing to horses than stone roads, at the same rate of speed."

—Plank roads, it is said, were first made in Russia; and their first trial in America was in Canada, where they were made by Lord Sydenham, who from a long residence in Russia, had become well acquainted with them, and was thoroughly convinced of their utility. We are informed that the Canadians are now so well satisfied of the great advantage of these roads, "that they have gone more extensively into the use of them than any kingdom or republic on the globe." These roads are chiefly in Canada West—the aggregate length of the different lines already constructed, being between 400 and 500 miles. We are not aware of the entire number of miles of plank road actually finished in the State of New York, but this report informs us that the various lines for the construction of which companies have been organized in this State, amount in the whole to a distance of 500 miles.

As to the *width of the track*, or the length of the plank used, the report states that it has been shown "most conclusively, that for a single track, eight feet is preferable to a greater width," and that where a double track is wanted, it is best to make them separately of that width. The planks are laid across the bed at

right angles. In regard to the necessity of more than one track, the report quotes the remarks of Mr. Geddes, in relation to the Salina road. Mr. G. observes "great speculative objection was made in the start to but one track; but we have now the entire community with us in deciding that, on all ordinary roads, one track is fully sufficient. The reason is this: the travel in wet weather is entirely on the plank, except the turning out of the light teams; but they seek the plank again as soon as they can get around the team met or overtaken, so that the turn-out track is not cut with any continuous lengthwise ruts, and perhaps the wheels of not one team in a hundred turn-outs will strike the exact curve of another; consequently, in our experience, our turn-out track being well graded, passing the water easily and rapidly from its surface, remains perfectly hard and smooth."

Sleepers or Stringers.—In one or two instances, roads have been made without sleepers—the plank being laid immediately on the graded earth. The planks have kept their places quite well; but it appears to be the conclusion that it is best to use sleepers or sills.

"The sills," (says the report) "should be well bedded in the earth, their top surface barely in sight, and the earth in which they are embedded should be broken and pulverized, so as to leave no stones or other hard substances to obstruct their settling evenly, and thus permitting the earth to sink down firmly on the earth as its main support. Two stringers only are used on the Salina road, 4 by 4 inches in size and none less than 13 feet in length; they should be so laid as to break joints, as in laying brick, or putting on siding, that is, the ends of the stringers on one side should not be laid opposite the ends of those on the other side. About 6 feet 8 inches is the proper width between the two lines of stringers, for an 8 feet single track road, which will bring them under the wheels of most road vehicles, and thus give a continuous bearing on them. One set of sleepers of good timber and well bedded, will last as long as two or three plankings."

Grading.—It is directed that the road should be graded twenty-one feet wide, "measuring from the inside top-lines of the ditches on each side." Great care should be used that the road be kept dry by means of side ditches and cross culverts. They should be made fine, firm and smooth.

In regard to lengthwise grading, it is observed that short rises are sometimes made of one foot in ten, though they are generally from one foot in twenty to one foot in thirty. Mr. Alvord's remarks on this subject are quoted. "It is easier to go over the same elevation on a plank road than on a common dirt one; for on plank there is no cutting into the substance passed over, nor encountering of stones by the wheels; and if, as it ought to be, the plank way is covered with a slight coating of earth, the only danger suggested, the slipping of the animal, is avoided. It would be a prettier sight for the eye, were we to grade our plank roads more level; but while their practical utility is not lessened in any perceptible degree by their unevenness, economy forbids the expense of *leveling* them for *ornament*."

The *kind of timber* used for planks is oak, hemlock, or pine. Oak lasts as well as any wood, but is *slippery* in wet weather. The wear by abrasion is calculated at one-fourth of an inch in two years; "and as planking will not break through till one and a half or two inches of the surface is worn away, it follows that the duration of the plank, (if of pine or other soft timber,) would be eight years." Oak would generally last, it is thought, fifty per cent. longer.

The cost of plank roads is estimated at from $1,500 to $2,000 per mile.

Plank Roads preferred by Farmers.—The opinion is advanced in the report that "railroads can never be made to take the place of teams for the transportation of grain, &c., within one day's drive of a market, because the farmer can carry the cheapest for that distance."

"There are seasons when work is slack with almost every farmer; yet his teams are daily consuming as much food at such time as when fully employed. Availing himself of these seasons, he can haul his produce to market with a very few shillings' expense, in addition to what would have been incurred had his team remained idle in their stalls."

The inducements for farmers to take stock in plank roads, are summed up as follows:

"Now, in view of these facts and suggestions, it must readily occur to every farmer, within a reasonable distance of the line of a plank road, that he can better afford to take stock in such a company than any other of our industrial classes, because he can more cheaply pay for his shares—by *working them out* on the road. Every head of a family, with his teams, scrapers, shovels, and other implements which are always at hand in the cultivation, &c. of his farm, could, during those leisure times which every one occasionally enjoys, work out from one to a dozen shares, according to his force and proximity to the road, without any serious diversion of his attention from his regular vocation, or perceptive detriment to his crops. In fine, to all classes of farmers, no scheme was ever devised that afforded so rich an assurance of immediate and positive benefits to *them*, as the construction of plank roads in the neighborhood of their farms." *Cultivator.*

ART. V.—THE RISE, PROGRESS AND INFLUENCE OF THE FINE ARTS.

BY ALFRED S. WAUGH, ESQ.

Messrs. Editors:—I pray you, my dear sirs, to excuse me for the shortness of this article. I will make amends in my next. A. S. W.

ARCHITECTURE.

As it is no stretch of the imagination to suppose that man, after his expulsion from the Garden of Eden, first exercised his inventive powers in the construction

of a simple domicil, we will give precedence to architecture in these papers, for she claims priority of all the arts, and shall accordingly receive our first respectful attentions.

At present, she takes the third rank among those arts denominated fine, and is one of that ennobling sisterhood which demands of its votaries, a refined taste, profound judgment, and a high degree of mental culture in order to accomplish its designs. It ministers to the comforts and intellectual gratification of man in the highest state of civilization, raises a shield of defence in time of war, and throws around the devotee, when bowed before the altar of Omnipotence, a feeling of awe and reverence, commensurate with, and inseparable from, the sanctity of His pure and holy worship.

But, unlike either Painting or Sculpture, it is more tramelled with prescribed rules—the imagination has a lesser field wherein to exercise the fancy, and a line of demarcation has long since been drawn, beyond which it may not go. Like its nobler sisters, it ranks the nations where it is cultivated, high in the scale of civilization, and is a good criterion by which to judge of the refinement of a people.

It would afford to the contemplative enquirer, an ample and interesting occupation, were he to trace the gradual development, advance, and final excellence of this branch of art; and to this end, he could not do better than to direct his attention to it here in his own loved native land.

On this immense continent, he has only to cast his eye over the vast forests and prairies of our north-western territories, and to the populous cities of the east, and he will find every example, from the rude wigwam of the Aborigines, the log hut of the pioneer, the neat dwelling of the farmer, the substantial houses of the merchant and mechanic, and the marble palace of the *millionaire*, up to the grand and imposing structures of the States and General Government. In all these, he will see its rise, progress and influence on society at large.

The untamed denizen of the wilds, like the first children of the world, contents himself with a mere shelter, and relies upon the spontaneous productions of the earth, or the precarious fortunes of the chase, for a subsistence. The newly arrived settler, resembling man a little advanced from primitive simplicity, constructs his habitation of logs—at once a shelter, and refuge in danger—and cultivates his fields, that in due season he may reap the kindly fruits thereof. The merchant and mechanic, living in communities in a state of further advancement, and depending, not so much on manual as mental labor, raise for themselves substantial buildings, whilst the prosperous citizen erects a marble palace, glowing in all the symmetry of architectural splendor, and enriches its interior with the intellectual embellishments of Painting and Sculpture.

In each progressive stage of this art we see the march of mind; its advancement is the result of civilization, and its excellence the test of refinement. The observant traveler, as he passes over a country, can form a correct estimate of the

character of its inhabitants, by the prevailing style of the buildings—*private*, as well as *public*—for, the mind invariably communicates its tone to all works of art; and in exact proportion to its elevation or depression, will *they* rise or fall in the scale of greatness. And, for the love bestowed upon her by a nation, does architecture acknowledge her sense of gratitude, by bestowing upon the people at large, a calm, a happy influence—exalting the public taste, and engendering a love of country and self respect.

[TO BE CONTINUED.]

COMMERCIAL STATISTICS.

THE following extracts from the Merchants' Magazine were not observed until after we had sent to the press the article, in this number, on the "Artificial Agents of Exchange,"* and also, our remarks upon the effects that the production of a considerable quantity of the precious metals in New Mexico would be likely to produce upon the prosperity of the other States of the Union.† Had the facts contained in these extracts been before us at the time of writing those articles, we should have used them for the purpose of illustrating our arguments. We publish them at present, for the purpose of affording to the reader an opportunity of considering them in connection with those subjects:

MOVEMENT OF SPECIE, PORT OF NEW YORK, NOVEMBER 1ST TO MAY 17TH.

	Import.	*Export.*	*Nett Export.*	*Duties Paid.*	*Total Demand.*
November,	$58,915	$1,455,946	$1,397,031	$1,024,766	$2,421,797
December,	39,712	1,888,867	1,849,155	856,576	2,705,731
January,	48,030	1,183,517	1,135,485	2,305,017	3,440,502
February,	49,502	433,226	383,724	2,416,497	2,800,221
March,	22,781	452,507	429,726	1,553,003	1,982,729
April,	65,917	1,180,422	1,124,505	1,686,506	2,811,011
May,	18,280	1,600,000	1,681,720	554,875	2,236,595
Total,	$303,139	$8,194,485	$8,001,346	$10,397,244	$18,398,476

These give the figures as represented by the New York official returns. They do not, however, embrace either the amounts sent from New York to Boston for shipment, or those large sums received from abroad through emigrants, and not returned at the custom-house. These last are known to be considerable. In fact, the New York Banks, which held $9,000,000 November 1, had lost but $2,000,000 May 16. Very considerable sums had, however, been received from the country banks following the course of exchange, which is every where in favor of New York, arising from the considerable purchases of goods for the country. While

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produce sent down has sold in small quantities, and at very low rates, at the same time foreign bills have been scarcely available in New York; therefore, a very considerable resource has been cut off. This state of affairs gives rise to rumors injurious to the credit of many banks. The state of the exchanges depends, in an eminent degree, upon the course of events in Europe, particularly in France, where one of the chief features has been the continual encroachments made by the Provisional Government upon the rights of private property.

This is the simple and certain mode in which foreign revulsions affect this country. The drain commences in the eastern cities, but as soon as its approach is perceived or apprehended, they begin to draw the precious metals from the west; and thus, it is not until the latter is completely exhausted, that the former, in reality, begins to suffer. It is true that large amounts of specie may be shipped by every packet, but so long as the vacuum continues to be filled from the west, the amount in the east remains the same. But the west having been drained, and the channels of circulation once dried up, it possesses no resources in its rear from which it can be replenished, and must wait until the storm is past, and the tide again returns from the east.

The following statistics, with the remarks connected with them, are, among other things, calculated to show the important effects resulting from the increased production of the precious metals in Russia:

One of the most remarkable features of the last few years, has been the continued large amounts of specie that have reposed in the vaults of the banks of the leading cities of the commercial world. It would seem, so far from an increase of commercial transactions requiring an increase of coin, as those would teach who hold that there is not specie enough in the world to transact its business without the aid of bank paper, that actually the increase of business throws specie out of employment. As an indication of this process, we may take the official returns of the banks of four cities at the close of four years, reducing the sums to United States currency:

SPECIE IN BANKS OF FOUR CITIES.

	1842.	1844.	1846.	1847.
Bank of England,	53,015,000	74,715,735	72,802,530	75,180,227
" France,	36,984,677	45,955,653	14,912,965	23,220,647
Banks of N. York,	7,244,005	6,130,456	9,180,240	9,107,920
" N. Orleans,	4,58g,737	8,138,987	7,930,246	7,252,103
Total,	$101,830,419	134,940,831	104,825,981	114,760,897

From 1842 to 1844, the specie at these four points increased $33,000,000 coming out of the channels of circulation when business was active, commodities plenty, and their interchange, by means of individual notes and bills of exchange, unchecked by distrust. In 1846, the failure of harvests, by taking away one description of commodities, caused a demand for the precious metals for an extra-

ordinary purpose, and the Bank of France underwent a drain so severe as to compel it to borrow £4,000,000 specie of the Bank of England. The continuance of this drain, arising from the same causes, brought the Bank of England nearly to ruin in October last. The reason of this was not so much the want of specie for the purposes of trade, as because distrust had fallen upon individual bills, and every body, in all countries, wanted specie only. As the engagements outstanding were completed, and no new ones entered into, the demand for specie became less and less, and it continually returned to the bank, until the amount in hand is as large as at the moment of the greatest confidence. Thus a stagnation of business and a state of perfect confidence seems to produce the same results; namely, to dispense with coin. The precious metals, therefore, act only in a moment, as now, when nothing else will answer; and it is coming and going across the Atlantic at great expense, for no other reason than that other commodities are not available to discharge obligations, and promises cannot be trusted. It is to be remarked, that while the shortening of communications and the improvements in systems of trade are thus operating to lessen the importance of the precious metals, the supply of the latter is rapidly on the increase. The chief quarters whence they are derived now, are Russia and Mexico; the former for gold and the latter for silver. The mines of Russia have already become so prolific as to have produced an important influence upon the affairs of nations. The large supplies that came opportunely to the aid of the Banks of France and of England, at the moment of the crisis last fall, alone prevented that general explosion of credit, in a state of peace, that is now likely to grow out of a general war.

The mines of Russia are in Oural, discovered in ——, and in Siberia in 1829. The quantity produced down to the close of 1846, as expressed in the official journal of St. Petersburg, and reduced to pounds and dollars at the English mint price of gold, is as follows:

RUSSIAN GOLD PRODUCTION FROM 1819 TO 1847.

	Poods.
1819 to 1843 - - -	8,603
1843 - - - -	1,283
1844 - - - -	1,341
1845 - - - -	1,386
1846 - - - -	1,722
Total poods, - -	14,335
Total pounds, - -	516,060
Value, - - -	$158,946,480

The Russian pood is 36 pounds avoirdupois; and the English mint price for gold £3 17s. 6d is, at an exchange of $4 80, equal to $308 per lb., giving the enormous sum here designated. The production of 1846, exceeding all former years, is $19,093,536, equal to twelve and a half per cent. of the product since

1819. Since 1842, she has produced $64,000,000 of gold, and the Bank of England has $20,000,000 more in its vaults.

There has been recently published a parliamentary paper, dated December 3d, 1847, in which a return of these facts is made. The following appears, by the return of the British consuls, to be the quantity of gold produced in the empire of Russia in the ten years ending with 1846:

1837	£900,673	1841	£1,316,653	1844	£2,730,647
1838	1,004,120	1842	1,848,808	1845	2,792,156
1839	1,003,403	1843	2,635,386	1846	3,414,427
1840	1,115,037				

It is added, in this return, that "there is reason to believe that considerable quantities have not been declared." And, also, that new mines have been discovered in the Oural; while the fact that an imperial ukase has lately forbidden the sale of public estates in the region of the auriferous sands of Siberia, justifies the inference that the government has made successful surveys in that direction. In the ukase of March 31, 1847, which orders the investment of £4,600,000 in the English and French funds, the "bullion fund" existing in St. Petersburgh is stated to amount to 114,000,000 of rubles, or nearly £20,000,000 sterling. This vast increase of the gold products of Russia has been one result of the long peace, which has operated powerfully against the Russian staple exports, as hemp, iron, quills, duck, &c. The growth of hemp in other countries of Europe has competed seriously with that of Russia; the development of the iron trade of England has curtailed the demand for Russian; quills have been extensively supplanted by steel pens; and her exports of tallow have diminished under similar competition. All these causes have turned her industry within herself, and the increased application of serf-labor to the gold mines is producing the results indicated in the above table.

The mines of Mexico have continued to send forth some $12,000,000 of silver per annum, feeding the circulation of France, where that metal is the standard; while England has been more than supplied with gold from Russia. In November last, the arrival of £1,000,000 in gold from Russia was the first opportune supply that flowed into the vaults of the bank. The large and increasing supplies still held by Russia, and reported at more than £100,000,000, are a chief element in the strength which that power has acquired since the last war, and will be a powerful means of supporting her troops in Europe. In the last wars, she bought gold of the Messrs. Rothschild for the supply of her military chest; she now stands in the attitude of the source of supply for all countries and all powers. The continuance of peace would, in a very short time, have produced a very sensible depression in the value of the precious metals, by the double operation of there being less needed in commerce, and greater in supply.

IRON MANUFACTURE IN GREAT BRITAIN, AND QUANTITY IMPORTED INTO THE UNITED STATES.

The following facts, which we gather from a lecture on the history and practice of mining in the British isles, recently delivered in Manchester, England, and reported in the *Manchester Guardian*, will show the advance which has been made in the manufacture of iron in the United Kingdom within a hundred years:

TONS OF PIG IRON MANUFACTURED AT DIFFERENT PERIODS.

Years.	*Tons.*	*Years.*	*Tons.*
1740	17,350	1828	702,584
1788	65,800	1830	653,417
1796	204,059	1840	1,396,400
1823	442,066	1845	1,750,000
1825	581,367		

The last statement, in respect to 1845, is only an approximation, being an estimate of Mr. McCulloch. There has, since 1840, been no means of ascertaining the extent of the iron manufacture, through a feeling of jealousy on the part of manufacturers. It is estimated that it requires three and a half tons of coal to produce a ton of iron. Supposing the present manufacture not to exceed Mr. McCulloch's estimate for 1845, the consumption of coal would amount to 6,125,000 tons a year. Add to this 3,000,000 tons for the conversion of pig iron into bar iron, and it would follow that 9,125,000 tons of coal are annually consumed in this single department of British industry.

There is evidence that iron was worked extensively in Dean Forest, in England, as early as 1065. So greatly had these works extended at the commencement of the sixteenth century, that a law was passed to restrain them from spreading further, on the imaginary ground of a scarcity of fuel. Oliver Cromwell was an extensive iron master, having been a partner in a firm which had large works in Dean Forest.

The quantity of manufactured iron and steel imported into the United States from Great Britain, during the last fiscal year, was not far from 65,000 tons, according to the annual commercial and tonnage statements of the Register of the Treasury. Those statements show, under different heads, the following importations:

Wire,	lbs.	92,064
Nails, screws and spikes,		750,502
Cables,		2,292,192
Wrought, for locomotives and engines,		52,855
Malleable,		17,599
Saws,		4,348
Anchors,		28,202
Anvils,		1,268,440
Blacksmiths' hammers and sledges,		103,403

Castings,	lbs.	962,660
Hollow ware, sad irons, and hinges,		970,143
Axletrees, nail rods, &c.,		371,932
Sheet and hoop iron,		5,974,960
Pigs,	cwt.	474,147
Scrap,		27,868
Bar,		582,685
Steel,		89,757

Equal to 65,175 tons, valued at $3,627,313, imported into this country from Great Britain alone.

CANAL TOLLS.

TOLLS ON THE ILLINOIS AND MICHIGAN CANAL.

We published in the April number of the Western Journal, a table of the rate of tolls adopted by the Commissioners. It seems, however, that these rates were considered too high, and have since been revised. We take the following table of rates from the Missouri Republican:

The following are the rates of toll as revised and determined upon by the Board of Trustees:

1. *Rates of Toll on Boats.*

	CENTS.	MILLS.
On each boat used chiefly for transporting common freight 3½ cents per mile,	3	5
On each boat used chiefly for transporting mineral coal, 3 cents per mile,	3	
On each boat used for transporting passengers, 6 cents per mile,	6	

2. *On Passengers.*

On each passenger, 8 years old and upwards, 4 mills per mile,	0	4

Note.—Each passenger 8 years old and upwards shall be allowed 60 pounds baggage or household furniture (if belonging to or used by such passenger) free of toll.

3. *On the following named articles toll will be computed according to weight, that is to say, the following rates per mile will be charged on each 1000 pounds, and in the same proportion for a lesser or greater weight:*

	MILLS.		MILLS.		MILLS.
Ale,	10	Grease,	7	Peas,	10
Agricult'l Implem'nts,	10	Ginseng,	10	Provis'ns, salt & fresh	10
Animals, domestic,	10	Grindstones,	6	Pork,	8
Anvils,	15	Gypsum,	6	Pot and Pearl Ashes,	10

	MILLS.		MILLS.		MILLS.
Ashes, wood,	4	Glass and Glassware,	15	Porter,	10
Beef,	8	Hemp,	7½	Palm Leaf,	10
Beans,	10	Hides,	10	Potters' Ware,	10
Bread,	10	Horns and Tips,	10	Pitch,	10
Beer,	10	Hair,	10	Potatoes and other ve-	
Butter,	10	Hoops,	15	getables,	6
Baggage,	20	Hams,	10	Paper,	15
Beeswax,	10	Household Furniture,		Powder,	15
Bacon,	8	accompanied by and		Rags,	9
Brooms,	10	belonging to fami-		Rosin,	9
Broom handles,	10	lies emigrating,	15	Rye,	6
Broom corn,	10	Hay and Fodder,	5	Salt,	6
Bristles,	10	Heading,	3	Seeds,	10
Burr Blocks,	12	Hoops & materials for,	3	Salæratus,	10
Barley,	10	Hubs, boat knees and		Salts of Ley,	10
Buckwheat,	10	bolts,	2	Soap,	10
Blooms,	15	Iron, pig and scrap,	7½	Sumach,	10
Bran,	5	Iron, wrought or cast,	12	Sugar,	12
Bark, tanners'	5	Iron Tools,	15	Skins, animal,	10
Barrels, empty,	10	Ice,	1	Sleds and Sleighs,	10
Coffee,	12	Leather,	15	Saddle trees,	10
Crockery, in crates,	15	Lard,	8	Shorts and Screenings	5
Cheese,	10	Lime, common,	3	Ship stuff,	5
Crackers,	10	Lime, hydraulic,	3	Spikes,	12
Cordage,	10	Lead, pigs and bars,	1	Starch,	10
Cotton Bagging,	10	Merchandise, includ-		Shot,	10
Cotton, raw, in bales,	10	ing dry goods, groce-		Steel,	15
Coopers' Ware,	10	ries, hardware, cut-		Spirits, except whisky	25
Carpenters and Join-		lery, crockery, and		Straw,	4
ers' Work,	10	glassware, and all		Staves,	3
Carriages,	10	articles not specified	15	Sand and other earth,	2
Candles,	10	Manilla,	10	Stone, cut and sawed,	3
Corn,	3	Malt,	7½	Tallow,	8
Cider,	8	Molasses, in hogs-		Tar,	10
Clocks,	20	heads or barrels,	12	Tombstones, not mar-	
Charcoal,	5	Meal,	5	ble,	6
Coal,	1	Marble, unwrought,	6	Trees, shrubs & plants	6
Coke,	2½	Marble, wrought,	15	Tobacco, not manu-	
Clay,	2	Marble dust,	9	factured,	7½
Eggs,	10	Millstones,	12	Tobacco, manufact'd,	15
Flour,	7½	Machinery,	12	Veneering,	10

	MILLS.		MILLS.		MILLS.
Flax,	10	Mechanics' Tools,	15	Vinegar,	10
Fruit, home,	10	Manure,	3	Wheat,	7
Fruit, foreign,	15	Nuts,	9	Whisky & high wnes	10
Fish,	10	Nails,	12	Wool,	10
Furniture, household,	20	Oats,	3	Woodenware,	10
Feathers,	15	Oil Cake,	6	Wagons and other ve-	
Flags, for chairs,	15	Oil, linseed and corn,	12	hicles,	10
Furs and Peltries, all		Oil, lard,	10	White Lead,	15
kinds,	25	Ore,	3		

4. *On the following named articles toll per mile will be computed by number or measure:*

	CENTS.	MILLS.
On each 1000 feet (board measure) of lumber per mile,	1	
On each 100 cubic feet of timber, hewed or round, if transported in boats,	1	
On same, if transported in rafts,	2	
On each 1000 brick,	1	
" 1000 laths or shingles,		5
" 100 split posts, or rails for fencing,	1	
" cord of wood for fuel,	1	2
" cubic yard (27 cubic feet) dressed stone,		5
" cubic yard (27 cubic feet) undressed stone,		2

In ascertaining the amount of toll chargeable on any article, the weight of the cask, box, bag, crate, vessel or thing, in which said article is contained, shall be added to the weight of the article itself, and the toll computed accordingly.

If two or more articles, chargeable with different rates of toll, shall be contained in the same cask, box or vessel, the whole shall be charged with the highest rates of tolls chargeable on any article so contained.

The rafting of timber on the Canal or the Feeders is prohibited, unless by written special agreement with the Superintendent of the Canal. Any violation of this order will subject the person violating it to a fine of ten dollars for every such offence.

The first boat that arrived at La Salle from Chicago, was the packet *St. Louis*, on the 27th April last. The canal is now in complete operation, and although there is a great variety of opinion in regard to the effect which it will have upon the commerce of St. Louis, all agree that it will be of great benefit not only to the district through which it passes, but to the country at large. The effects which this line of transportation is destined to produce upon St. Louis and Chicago, or the intermediate towns, can only be determined by time. We think, however, that it is safe to conclude that whatever benefits the country, must, in the end, prove beneficial to the towns, especially if the towns are themselves producers;

it may be otherwise if they should be simply commercial. Believing that the future growth of St. Louis will depend more upon manufactures than commerce, we are decidedly of opinion that the Illinois Michigan Canal will be of incalculable advantage to its prosperity.

STEAMBOATS BUILT AND LOST ON THE WESTERN WATERS.

THE third number of the *Western Boatman* is before us. It is conducted by Mr. Embree, and contains a great deal of useful information on the subject of boats, boatmen, navigation, river laws, &c. In our opinion, it is a most useful work, and ought to be encouraged. Mr. Embree has furnished a list of steam boats built on the western rivers, down to the year 1835. Since that time the number built has been vastly greater. This list, however, shows the manner in which the *death* of boats is brought about. The *Boatman* says:

From the foregoing list we find 684 boats, measuring 106,135 tons, averaging 155 tons each: 344 worn out or abandoned, 50½ per cent.; 238 snagged or otherwise sunk, 34¾ per cent.; 68 burnt, 10 per cent.; 17 lost by collisions, 2½ per cent.; 17 explosions, 2½ per cent.

The 17 boats which had their boilers burst, were the Washington, Union, Atlas, Caledonia, Porpoise, Cotton Plant, Tallyho, Tricolor, Car of Commerce, Alabama, Hornet, Kanawha, Helen McGregor, Huntress, Gen. Robinson, Arkansas, and Teche.

Average age of boats worn out or abandoned, five years nearly.

Average age of boats sunk, burnt or otherwise lost, four years nearly.

P. S. Boats of which we have no dates of loss are calculated by the accounts obtained.

BUILDING.

Built in Pittsburgh District, - - - - -	304
Built in Cincinnati District, - - - - -	221
Built in Louisville District, - - - - -	103
Built in Nashville District, - - - - - -	19
Built in other places, - - - - - - -	37
Total, - - - - - -	684

Number of boats built in each of the following years: 1811, 1; 1812, 0; 1813, 1; 1814, 2; 1816, 5; 1817, 8; 1818, 31; 1819, 34; 1820, 9; 1821, 7; 1822, 10; 1823, 14; 1824, 13; 1825, 32; 1826, 60; 1827, 24; 1828, 35; 1829, 55; 1830, 43; 1831, 61; 1832, 80; 1833, 48; 1834, 59; 1835, 52; total, 684.

Note.—We have accounts of the explosion of the following boats, not in the list: Constitution, 1817; Heriott, 1817; Grampus, 1828; Feliciana, 1825; Fair Star, 1830; Rumapo, 1826.—[*Missouri Republican.*

AGRICULTURE AND AGRICULTURAL IMPROVEMENTS.

FARMER'S CLUB.

THE "Farmer's Club" held its regular monthly meeting at Dr. Thomson's residence.

It was remarked that Mr. Affleck, of Mississippi, in an interesting article furnished to De Bow's Review, an ably conducted periodical, on the subject of the Cherokee Rose as being suitable for live fences, expressed the opinion that though an evergreen at the south, it would stand our northern winters. Mr. Holcomb said that he understood Gen. Brandon, of Mississippi, had sent, a year or two back, several hundred young plants to Mr. George, of Baltimore, but had not heard how they succeeded. Dr. Thomson observed there was no doubt of their standing the winters of Baltimore or Delaware, that he had a shrub obtained of Mr. Landreth, then on his grounds, which had been there two or three years. According to Mr. Affleck's accounts, it is being extensively used in the southern States, as a live fence, plantations in the neighborhood of Natchez, as well as in parts of Louisiana, being fenced with it, and nothing can exceed its beauty and utility as a fence. Doubts were expressed by the Club, whether it was as well adapted as the Osage Orange for more northern latitudes. Mr. Holcomb remarked that in a southern and western trip he had recently taken, he had made many inquiries. and what personal examinations he was able to, as to the fitness of this latter shrub for live fences; he was of opinion that it would, at no distant day, constitute the principal fences in the Western, Middle, and perhaps Northern States. Unlike the New Castle Thorn, it seemed to grow on almost any soil. You might plant the seed, drilling it as you would a row of corn—the hedge required no bank to it. They were bringing the seed from Texas, and the Red River country by hundreds of bushels. One bushel will enclose sixty-four acres. For the western prairies it would prove invaluable, and scarcely less so to us, where fencing material is so high. Common cedar rails are now selling for eight dollars a hundred with us.

Dr. Thomson.—I have plants two years old, of the Osage Orange, in my garden; I wish the Club to examine them, and I wish to present them with specimens of them. This subject of live fence is one of vast importance—second to no other in the whole range of Agricultural economy. Several years back the late Dr. Gibbons, Dr. Darlington of West Chester and myself at the instance of some of our Western Agricultural friends, acted as a committee in investigating and reporting upon the value of the New Castle and Virginia Thorn for live fences. Our report was unfavorable to their general use. From what I have seen of the Osage Orange, and what I have heard of its habits, its hardiness as a shrub, its thriftiness of growth, I incline to think with Mr. Holcomb, that it is likely to furnish with live fences, vast rural districts of our country.

Mr. Sawdon.—(Having carefully examined the shrub.) The thorn very much

resembles the English Hawthorn at the same age—it is well covered with thorns. I see no reason why it should not make a good fence.

Mr. Jackson—I have started a young nursery of it, and hope to have a good many plants ready by next spring.

Mr. Gibbons (an invited guest.)—If the Osage Orange should indeed be found to supply the *desideratum* of a live fence in a country where there is so much timber annually destroyed, and such an immense expense incurred in erecting fences, it would take off a great burden from agriculture, which, according to the late Nicholas Biddle, is annually taxed in connexion with the building and keeping up of fences, in a sum that would almost embarrass the British Exchequer.

Major Jones alluded to a hedge of Osage Orange put out many years since in Maryland, by John Randall, Esq., Civil Engineer, and one still earlier was spoken of, put out by Mr. Mapa, near the "Rising Sun," Philadelphia county, as also the Osage hedges surrounding the beautiful residences along School House Lane, near Germantown.

In reference to the improvement in agriculture in New Castle county, within the last ten or fifteen years, the question was suggested as to what extent it had improved—what was the probable per cent?

D. W. Gemmill—The improvement throughout the county has been very great; it is difficult, perhaps to fix the average per cent., but if we take the farms belonging to members of this Club, with which we are all acquainted, there is no doubt that the production has been increased full fifty per cent. Go back fifteen years, and I have little doubt that the agricultural productions of New Castle county have been doubled. Lime and clover have been the great agents.

B. Jackson—If you select particular farms, the increase has been two or three hundred instead of fifty per cent.; fifty may approach an average for the county. As Mr. Gemmill says, lime and clover, and an improved husbandry—better ploughing—better preparation of the ground—more system, more care of stock, more economy of manures have all contributed.

Major Jones—The increase in the value of real estate has been somewhat in proportion to its increased productions; by an improved husbandry, the capital, while yielding twice its former income, has itself been doubled in amount.

Major Andrews—Suppose this so, that the improvement has been progressive to this time, how much farther may we improve to advantage? At an agricultural party at Sir Robert Peel's, as reported in the "Farmer's Library," one of the speakers—a practical agriculturalist—remarked, that "good high farming was by far the most profitable; the starvation principle was a losing game; if we borrow from the earth, we must repay, or we should soon find an empty exchequer." They have better markets and cheaper labor than we have, and can afford greater outlay, still I think we may go on improving as yet.

Mr. Jackson—Yes, very far beyond what we are at present.

Mr. Gemmill—I should have no fear of using capital in improving the best of

our land still farther, by the judicious use of lime, &c. I say judicious, for I know some instances, where land has been injured by the injudicious use of lime.

Mr. Sawdon—We may go on improving for a quarter of a century, and then be behind the improved agriculture of England; probably our markets will not allow our using the concentrated manures as they do, but lime we may buy.

Major Jones—The merit with us is not alone to make the two blades of grass grow, but to find where the one or two blades, as the case may be, may be sold. England scarce emptied our granaries one year, and it nearly bankrupted her. This was a year of famine which may not soon make a market for us again.

A number of copies of the "*Western Journal*," an agricultural periodical, ably conducted at St. Louis, were presented, in which the importance of the home market is thoroughly and ably discussed by M. Tarver, Esq., the senior editor.

Copies of the "*Farmer and Mechanic*" were presented and examined, and its merits highly commended.

The regulated Cultivator and Corn Planter, invented by Mr. Edson Hart, of New Albany, Indiana, was examined, and arrangements made for a practical trial in the field. Some members of the Club thought it promised to be a valuable implement.—[*Delaware Republican.*

WATER-ROTTED HEMP.

THE following letter from the Hon. Charles S. Morehead, a representative in Congress, will be read with interest by our numerous agricultural friends:

WASHINGTON, *May 21st*, 1848.

Dear Sir:—I received your letter of the 14th inst., and herewith enclose to you according to your request, the joint resolution passed at this session of Congress, respecting contracts for water-rotted [hemp, for the use of the American navy. You will perceive that the inspection and delivery of the hemp are to be at the place of purchase. Contracts may be made for a term of five years, not exceeding the average price for the last five years. I do not know certainly what this average is, having seen different statements on the subject. I fear that the statement I have seen published, (that it amounts to $238 per ton,) is not entirely correct. The Chairman of the Committee on Naval Affairs estimated the quantity needed annually at about 1,000 tons. Our commercial marine, when the character of the hemp shall be fully established, will require much more.

You ask if hemp is not used in France and other foreign countries, in the manufacture of canvas or sail-duck. I answer, it is, and its manufacture is becoming quite extensive in our own country. I have applied to a distinguished member of Congress, intimately acquainted with this subject, who has kindly promised to furnish me with the statistics of this manufacture in the United States as soon as he can prepare them. I understand that the best dew-rotted hemp may be used for duck.

This manufacture would become much more extensive, but for the unfortunate

discrimination in the tariff act of 1846 against it. Singularly enough, a duty of thirty per cent. ad valorem, is levied on raw hemp, and twenty per cent. only on the manufactured article, while the additional cost of the transportation of the more bulky raw material, increases the discrimination, and acts as a bounty to the manufacturer abroad, in all that is intended to be brought to this country. Formerly Russia exported about four times as much raw hemp as that in a manufactured state—I understand that this is not now the case, so far as this country is concerned, but our commercial tables have not yet been published, and I cannot speak with accuracy.

The entire product of hemp in Russia has been differently estimated. Perhaps that which places it at two hundred and forty millions of pounds is not far wrong. One-half of this amount is exported either in its crude or manufactured state, and the home value of which, some years ago, was estimated at $10,000,000.

France produces about one hundred millions of pounds of hemp per annum, but this has not been sufficient to supply her home consumption, and she imports from Russia and Italy seven or eight millions of pounds more, half of which, or more, is used in her Navy. The Italian hemp, I am told by those who have seen it, is a soft and beautiful article, and prepared with great care, but inferior to the Russian for the manufacture of cables on account of not imbibing or retaining pitch as well.

Hoping that the hemp growers of the west may be benefitted by a more liberal spirit on the part of the General Government towards this great interest,

I remain very truly your friend,

C. S. MOREHEAD.

P. S. Since writing this letter, I have received an accurate statement of the amount of Foreign and American Hemp purchased by the government, which I herewith enclose to you.

I send you the President's Message, &c., for the year 1843, in which, beginning at page 604, you will find an interesting document on the cultivation and fabrication of hemp.

Statement of Foreign and American Hemp contracted for and purchased from 1st of January, 1842, to 1st February, 1848.

FOREIGN HEMP.

Contracted for.	*Tons.*	*Rate.*	*Aggregate.*
Feb. 14, '42, T. B. Curtis,	500	$240 00	$120,000 00
Feb. 3, '43, T. B. Curtis,	688	200 00	137,689 64
Purchased,	753	252 57	190,185 21

Note.—Of the foreign hemp purchased, there were 174 tons at the rate of $299 80 per ton, a remarkably high price, and which affects the average price of the foreign hemp materially.

Total number of tons of foreign hemp, 1,941—total cost, $447,874 81—average price per ton, $234 74-100.

AMERICAN HEMP.

Contracted for.	*Tons.*	*Rate.*	*Aggregate.*
Sept. 25, '44, Francis Cox,	200	$195 00	$39,000 00
Jan. 23, '45, do.	100	195 00	19,500 00
Do. do.	50	230 00	11,500 00
Do. do.	250	219 00	54,750 00
Jan. 26, '46, American Hemp Company,	750	222 50	166,875 00
July 13, '46, G. J. Pillow,	90	200 00	18,000 00
Aug. 29, '46, G. W. Billing,	110	220 00	24,200 00
Do. do.	110	210 00	23,100 00
Do. do.	110	200 00	22,000 00
Purchased at average,	242	205 78	49,798 76

Total number of tons of American hemp, 2,012—aggregate amount paid, $428,723 76—average price per ton, $213 08.

You will see in averaging the foreign hemp that 688 tons are included, contracted for 3d February, 1843, more than five years before the passage of the resolution, and which was purchased at $200 per ton. I do not think that this can be fairly included, and if not, the average price would be as high as has been stated.

C. S. MOREHEAD.

[RESOLUTION—PUBLIC—NO. 5.]

Joint Resolution respecting contracts for Hemp, for the use of the American Navy.

Resolved, by the Senate and House of Representatives of the United States of America in Congress assembled, That the Secretary of the Navy be, and he is hereby authorized, if, in his opinion, it will be advantageous to the public interest, to make contracts for any term not exceeding five years, for the purchase of American water-rotted hemp for the use of the United States Navy, provided the same can be had of equal quality with the best foreign hemp, and at a price not exceeding the average price of such hemp for the last five years; the inspection and delivery to be at the place of purchase.

Approved, May 9, 1848.

JOURNAL OF MANUFACTURES, DISCOVERIES AND IMPROVEMENTS.

KAOLIN AND PIPE CLAYS OF MISSOURI.

Gentlemen:—We have received some specimens of the kaolin and pipe clays referred to by Mr. Frederick Woolford, in his letter recently published in your Journal, but have not found leisure sufficient to analyze them. Judging from their physical properties alone, we believe that two of them, from different localities, will prove to be nearly identical in constitution to the best kaolins, probably

possessing only a slight excess of alumine. One is slightly tinged red, and is colored by the oxyde of iron—the other is white, and with a due proportion of felspar and quartz, would no doubt furnish a beautiful porcelain. The felspar sent by Mr. Woolford, with these clays, is, we think, too much tinged with the oxyde of iron to produce a white porcelain; but from a specimen of granite sent with them, which resembles the graphic granite of New York and the New England States, it is probable that felspar of a suitable quality will be found in the vicinity of the kaolin. The felspar is beautifully white, but the quartz, though found in its usual proportion, has not the regular distribution in layers most generally observed in graphic granite. This is the first specimen of graphite granite, properly so called, which I have seen from Missouri.

The other specimens marked "kaolin," approach more nearly the nature of pipe clay. The excess of alumine in these is too great to render them useful in the manufacture of porcelain, unless as is practised at Sevres, in France, they are submitted to frequent washings to deprive them of their alumine. Compared with a specimen of kaolin in my cabinet, from Limoges, in France, they are somewhat too tenacious—forming what is termed a *long paste*. In other respects they are nearly identical in physical properties.

The pipe clays sent with these kaolins are of the finest quality, and must, at some future day, prove highly valuable to the manufacturer of queensware, flint or stone ware, and *other potteries*.

We regard the discovery of these clays as being of immense importance to the manufacturing interests of the State; for, among the earthy minerals, none are more useful in supplying the wants, the convenience, and even the luxuries of life than the clays—essentially composed of two ingredients—silex and alumine in varying proportions. Yours very respectfully,

H. A. PROUT, M. D.

Note.—We will endeavor to notice more fully these specimens when we shall have made an analysis of them.

CONSUMPTION OF SMOKE.

Gentlemen:—In accordance with promise I resume the subject of Smoke—its Consumption and Prevention. In my last I gave you a rough description of C. Y. Williams' Argand Furnace for the prevention of smoke. The principle of its operation is the consumption of the volatile gases emitted from the fresh supplies of coal thrown into the furnace; at which time the gasses are too voluminous to be properly ignited in furnaces of the ordinary kind. The waste of fuel arising from this source, is owing to the want of a proper quantity of oxygen being admitted in the proper place. It is urged by some as an argument against such plans, that the admission of the atmospheric air tends to cool the furnace, and consequently prevents the object desired. Such arguments appear futile when we take into consideration the chemical properties of light, heat, &c.; for it is definitely

ascertained, that to properly consume carbon, it requires ten volumes of oxygen to one of carbon. And when we examine the construction of our furnaces, it will appear evident that they do not admit this proportion of oxygen through the grate-bars when clear of clinkers; hence comes the volume of vitiating smoke from the smoke stacks. It is also demonstrated that oxygen will, (like carbon surrounded by oxygen,) burn brilliantly when surrounded by carbon. Thus you will perceive that by the peculiar construction of the Argand Furnace, the oxygen is admitted through the pierced tubes, (projecting up into the space between the boilers and their foundation,) with 1-4 inch holes, one inch apart; and those jets of oxygen being surrounded by the volumes of carbon as they escape. Brilliant lights are produced from each jet. These jets of flame producing their quantum of heat, the visible effects of this process is likened unto as many trees of fire as there are projecting tubes. Every careful experimental test of this furnace has given all, or more than its inventor claimed for it—a saving of twenty-five per cent!

There are other modes of consuming the volatile gases emitted from coal; amongst which is one known as *Ivison's plan*, which consists in throwing into the space between the fire and the boiler, a quantity of steam through a fan shaped jet. The theory of this plan is, that the oxygen of the steam combines with the carbon of the smoke, thereby producing combustion. The hydrogen of the steam burns of its own inflammable qualities. This plan answers very well so long as every thing keeps in good order; but the jet pipe is liable to be burnt, which frustrates the design. Now, to make a cheap application of this theory, let all our ash-pits be made so as to hold five or six inches of water, and the grate bars kept clear, so that when the clear, bright rays of the fire strike the water, and the hot ashes fall into it, the increased evaporation which takes place from these causes will make the fires burn more effectually than when the grate-bars are choked up with cinders, and the ash-pit filled with ashes. And do not let our firemen imagine to themselves that by keeping the ash-pit full of hot ashes they are thereby economizing fuel. It is very erroneous.

Another plan for the better combustion of coal, is one known by the title of *Jukes' plan*, which consists of moving grate-bars—which are in the form of an endless chain, moving on two rollers, at the rate of one inch per minute. One roller is placed about eighteen inches in front of the fire doors; on this projecting part of the bars the fireman spreads his coal, the bars moving forward under the doors, (which are generally about three and a half inches higher than the bars,) thus leaving an even layer of coal. The bars moving forward bring the coal in contact with the hot fire; then it commences to emit its crude gas. These gases have then to pass over the whole of the burning fire, whereby they become thoroughly burnt. The bars travel on and drop their ashes at the extremity of the pit; then passing over a gauge they are cleared of any cinders which may have accumulated durmg the burning of the coal.

If firemen would but study this, they might partially accomplish this object without endless grate-bars. Let the fireman, (when charging,) leave his coal in front of the fire. It will there coke; the fire behind it will burn the carbon in its passage over it. Then, when properly coked, take his rake, break, and spread it back. Thus he will have a bright, red, and even fire, and the smoke will have but a narrow chance to escape. M. F. P.

THE BOOT, SHOE AND LEATHER TRADE.

The history of this manufacture is a striking illustration of the boundless ingenuity of man, and of the multifarious wants of civilized life. If we look abroad (says a writer on this subject) on the instruments of husbandry, on the implements of most of the mechanic trades, on the structure of a vast multitude of engines and machines; or if we look at our own clothing—shoes, boots, gloves, caps, &c.; or at the furniture in our houses, the books on our shelves, the harness of our horses, and even the substance of our carriages, what a multitude of instances and forms of this manufacture, wrought out by human ingenuity, meet our eye! What an aptitude has this single material for the relief of our necessities, and the supply of conveniences, in every state and stage of life! Civilized society would suffer immense inconvenience and discomfort from the loss of this one article.

It is a curious, but true reflection, that, though the workers of the article, particularly shoemakers, have generally been ranked low in society, and even among their fellow mechanics, yet from that craft have sprung many of the most distinguished ornaments of our race—scholars, poets, philosophers, patriots, whose fame is immortal.

The aggregate annual amount expended in the boot, shoe, and leather business of this country, nearly reaches the total value of the cotton crop of the United States. As regards the amount of capital and number of hands employed, says the Troy Whig, the shoe business is said to take precedence of any other branch of manufactures carried on in America, producing commodities to the value of $50,000,000 and giving employment to between 100,000 and 200,000 operatives, men and women.

The statistics of productive industry in Massachusetts for 1846 show that there were made, during the year, the following amount of boots and shoes:

Counties.	*Pairs of Boots.*	*Pairs of Shoes.*	*Value.*
Suffolk,	32,479	47,631	$207,356
Essex,	1,288,170	8,380,179	4,876,534
Middlesex,	321,450	3,090,635	2,274,719
Worcester,	900,028	2,050,207	2,597,422
Hampshire,	20,867	19,293	66,775
Hampden,	9,992	50,697	71,998

Franklin,	34,315	32,020	85,254
Berkshire,	16,168	69,370	105,497
Norfolk,	832,844	1,024,464	2,357,010
Bristol,	46,732	130,246	194,794
Plymouth,	320,850	2,199,030	1,929,418
Barnstable,	30,075	17,500	27,625
Dukes,	240	1,790	3,385
Nantucket,	370	2,300	4,200
Total,	3,768,160	17,128,411	$14,799,140
Amount of leather made in the State in 1846,			3,836,657
Value of shoe pegs made in 1846,			18,206
Value of lasts made in 1846,			80,145
Value of India rubber shoes,			312,090
Total for Massachusetts,			$19,046,238

All this immense quantity of boots and shoes is made by the hand, no machinery being employed except for the manufacture of lasts and pegs. It is said that vast as the supply is, the market is never over-stocked. The twenty millions of pairs made every year in Massachusetts, are not sufficient for the western market, and we learn, from the Rochester American, that western dealers are compelled to leave their orders ahead, or go without the articles. Many dealers west of the lakes found the market so limited this fall, that they were unable to get their usual supply.

The Canada tariff of 1846 placed a duty on the American articles at so high a rate, that it amounts to prohibition. The Yankees, however, were not to be outdone by its operation. Messrs. Brown & Childs, of Montreal, have opened an extensive manufactory there, and employ some 400 workmen from Massachusetts. They are now supplying the dealers in the upper and lower provinces.

The Mercantile Times furnishes a statement of the same manufacture in England; from which it appears that the total amount of leather tanned, tawed, dressed, and curried, is estimated at 50,000,000 lbs., which, at 1s. 8d. per lb., is £4,166,000 as the value of the leather only. Supposing the value of the leather to amount to one-third the value of the articles produced from it, that would show a result of about twelve millions and a half.

The number of hands employed in all the various branches, from the tanner to the finisher of the finest manufacture of leather, is estimated at 275,000; while the wages paid amount to about £7,000,000 sterling, or nearly $34,000,000. Scotland is not included in this estimate.

STAFFORD'S PATENT PROCESS OF PRESERVING BREADSTUFFS.

Several notices of this invention have appeared in the eastern papers, all of them speaking highly of the invention. We have deferred any extended notice of it, until its merits should be to some extent tested. Messrs. E. W. Andrews & Co. of the Empire mills in this town, have had one of the machines in operation upon corn meal, for about one year. About 1500 barrels of this meal, manufactured last spring, was shipped to Europe. It not only performed the voyage of the lakes, canals and rivers of our own country, but after remaining during some of the hottest months in store, it was sold in Liverpool, for from 3s. to 3s. 6d. sterling, per barrel more than the current quotations of the market for corn meal. The enhanced price is understood to have been realized in consequence of the superiority of this process for expelling the moisture, over all others; meal prepared by this process being devoid of any other taste or smell than that which pertains to the natural meal. Heretofore it has been deemed necessary to destroy the germinating principle of grain, to enable it to withstand the vicissitudes of climate, and hence the parched, ill-flavored meal that is usually sent abroad, being divested of much of its nutrition, is rendered entirely unfit for the use of man. Mr. Stafford's theory is, that without the presence of moisture nothing in nature can change. Upon this theory is his machine made to operate. It is simplicity itself. A cylinder armed with flanches on the exterior, is made to revolve in a trough—the inclinations of the cylinder and trough moves the substance to be dried gradually to the opposite side from which it was received. The interior of the cylinder is heated by steam. By this simple process Mr. Stafford is enabled to obtain all that is requisite for preserving grain, flour, meal, &c., for an indefinite time. The heat is uniform, the motion of the article drying is constant, and the ventilation perfect.

So far as we are able to judge of this invention from the tests already made of its utility, we are inclined to regard it of very great importance, particularly to the grain-growing regions of the west. The amount saved to the Government would be large if they would supply the ships of the navy with flour and meal sufficient for a long voyage, with a perfect assurance that they would remain good for any length of time. So of whale ships, &c. Mr. Stafford richly deserves not only the large pecuniary benefit which is already made sure to him, but also the gratitude of the world.

The Cleveland Herald says: Flour from Ohio wheat, dried by Mr. Stafford's process, loses 8 per cent. of its weight. This fact has been recently tested at Elyria. When, therefore, dried flour is exported the miller will save transportation upon 16¼ pounds of water to each barrel, the consumer paying at the same rate for 196 pounds of dried flour that he would for 212 pounds of undried. The consumer, then, has the certainty of purchasing and having flour always sweet and fresh, instead of running the risk of buying flour which is stale, musty, or sour.—[*Elyria (Ohio) Courier.*

SELF-DISCHARGING FLOUR CHEST AND FLOUR PRESS COMBINED.

This is the name given to a new invention for packing flour, recently introduced into some of the Oswego mills. Col. W. J. Pardee has just put one in successful operation in his Congress Mills, and it is believed the invention will very generally take the place of the old system of packing. In construction, it is simple and packs a barrel in about a minute. The garner into which the flour is received from the bolts is capable of holding four hundred barrels. The empty barrel is placed under the garner, which tapers in size to be received by the barrel. A shaft, to which are attached blades so constructed and set as to form something like a screw, is let down into the barrel. The machinery sets it in motion, it lifting itself as the flour is let in and packed by the blades. But two men are required to do the packing for three run of stone, a great saving on the old plan.

Those who know any thing of the old system of packing, will at once understand the advantages of this invention, besides the saving in expense. We understand Burckle & Co. have introduced the machine into their mill, and we presume others will do the same. Mr. Kingman is the inventor.—[*Oswego Times.*

ATMOSPHERIC CHURN.

We have been shown a new CHURN, invented and patented by Lewis & Johnson, of Springfield, Ill., the 9th of May last, which operates on a new, but correct philosophical principle, and with incredible ease and rapidity. The principle consists in the introduction, by means of exceedingly simple machinery, of the atmospheric air into the body of milk. The air, by its own action, produces the separation of the milk from the butter. The machinery is very simple, and the principle undeniable, and the operation of churning can hardly be said to be labor at all. By this machine, an ordinary churning could be made by a child of four years old, and that, too, without waiting for the cream to rise or the milk to sour.

The names which appear to the following certificate are a sufficient guaranty that the facts therein stated are true:

This is to certify that the undersigned, citizens of St. Louis, and others present, witnessed the exhibition of Lewis & Johnson's Patent Atmospheric Churn, at Scott's Hotel, this afternoon, at 3 o'clock, P. M., when butter was made from new sweet milk in fifteen minutes, and from new sweet cream, skimmed from morning's milk, in less than five minutes. From this exhibition, we are fully satisfied that this is a most useful invention, based and operated upon strictly philosophical principles, ingeniously but very simply brought into use.

John H. Gay, Trusten Polk, John Libby, Thos. S. Warne,
C. M. Doolittle, Cincinnati, W. P. Fenn, firm of Clark & Fenn,
P. P. Knapp, do., Nath'l. Lanburn, Knox county, Ills.
W. C. Scott, proprietor of Scott's Hotel.

June 1st, 1848.